THE IRON TRADE REVIEW

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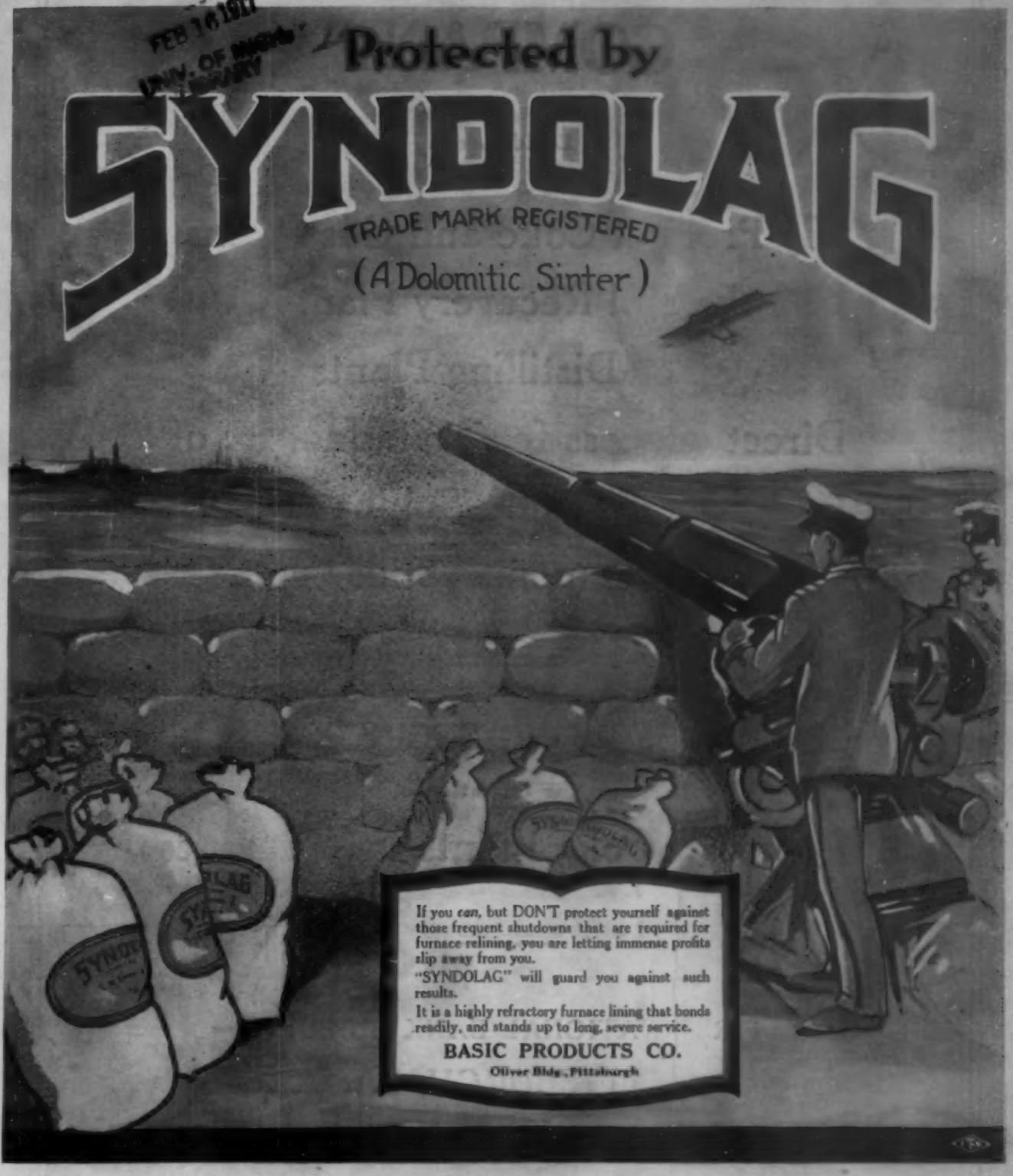

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THE IRON TRADE REVIEW

Vol. LX Cleveland, February 15, 1917 No. 7

Railroad Embargoes Outdo U-Boats

In Effect on Domestic Iron and Steel Markets—Traffic Situation is More Disturbing Than Foreign Complications—Government is Preparing for Heavy Steel Purchases

AS THE second week of unrestricted submarine warfare draws to a close, it is evident there is going to be no immediate readjustment of the American steel trade due to blockaded foreign shipments. What the next month may bring forth no one knows, but for the present, fears of market demoralization resulting from the resale of huge quantities of export material have been relegated to the background. The iron and steel industry, it is true, is suffering acutely from traffic paralysis, but the trouble lies with the American railroads rather than on the high seas. Staggering under unprecedented burdens, thwarted by inefficient labor and numbed by subzero weather, the railroad system of the United States has virtually collapsed.

The Railroad Tieup

The resulting disorders are daily becoming more pronounced throughout the entire range of the iron and steel industry. Coke shortage, due largely to lack of cars, has necessitated banking many blast furnaces. Pittsburgh and valley sheet mills are being asked to forward special lots by express. Tin plate makers throughout western Pennsylvania, Ohio and West Virginia are practically at a standstill, with shipping platforms overflowing. Atlantic and Pacific coast ship builders are impatiently awaiting the receipt of important tonnages from eastern mills. Some Pittsburgh manufacturers of rolled steel, including plates, have as much as 50,000 tons of material dammed up, waiting for cars. Fabricators in trunk line territory are at their wits' ends and in some cases have been forced to reduce operations severely pending the receipt of plain material from the mills. Virtually every manufacturer is spending extraordinary sums to keep traffic moving. The situation is an important market factor.

Government Buying

The government is going forward with its preparedness activities under high pressure and the rush of steel demand has been intensified by war prospects. Bids are being considered at Washington for 8,000 tons of military structural work, including crane runways for the Norfolk navy yard and an aeroplane hangar at Pensacola, Fla. Manufacturers who may be called on for quantities of war material are preparing. In this category is the Bethlehem Steel Co., which has just contracted for 5,000 to 10,000 tons of standard low phosphorus pig iron at $57.62, delivered.

Pig Iron

The traffic situation has upset the pig iron market. Melters unable to obtain shipments, in many instances are buying spot iron at prices named by themselves. Dealers unable to ship to all points have been forced to unload at any price they can get. Prices are higher all along the line. Foundry iron has been advanced $1 a ton in southern Ohio, and to $32, furnace, in Chicago. Bessemer is now quotable at $35 to $36, valley. Virtually all of the low-priced basic has been cleaned up and $30, valley, appears to be the minimum. A Harrisburg, Pa., steelmaker has sold 20,000 tons of 0.20 per cent phosphorus basic to Italian consumers at over $32.50, tidewater. Foreign interests have closed on fully 100,000 tons during the past 10 days. Most of these orders call for bessemer iron at $36.50 to $37, tidewater. Deliveries are to begin in April.

Finished Materials

The Morgan line has closed on six 10,000-ton steamers. The Union Iron Works, San Francisco, has a contract for two more ships. Other important boat contracts are pending. The plate market, therefore, remains unusually congested with ship plates standing at 6c, Pittsburgh. The French government is seeking 12,000 tons of ship steel, including 7,500 tons of plates. Bids have been received in the east on several large structural jobs and considerable tonnage remains to be placed. Quotations on all sizes of butt and lap-welded black and galvanized steel and iron pipe have been advanced two points, or $4. Unusually large inquiries for export rails are pending in the east. This business aggregates fully 75,000 tons, excluding French government requirements. A rail shortage is anticipated.

THE OPEN HEARTH

Must Remove Suspicion

ONE OF THE most important papers read at the recent foreign trade convention in Pittsburgh was by James Carson, who, as representative of the Associated Press for 10 years in Latin-American countries, had had extraordinary opportunities of becoming acquainted with the sentiment prevailing in those countries toward the United States. Mr. Carson had only recently returned from a trip of 13,000 miles through the republics of South America and was able to give the very latest information on the topic which he discussed, the relation of world news to foreign trade. The close attention which he received and the enthusiastic applause with which he was greeted at the closing of his address furnished positive evidence of the keen interest of the large audience of representative business men who heard him. Compressed in a few words, it may be stated that Mr. Carson found the following to be the facts in regard to our trade relations with South America and the rest of the Latin countries:

1.—There is a general air of suspicion and hostility throughout Latin America towards us because they believe

(a) That we have imperialistic designs on part of their territory.

(b) That in matters of trade we are disposed to drive a sharp bargain, even to the point of being dishonest, within the law, in the matter of quality, time of delivery, etc.

(c) That in our business dealings we are arrogant, looking down on South and Central Americans because of our prejudice in the matter of color.

(d) That our relations with them are strictly commercial, in that we want their money, but not their society or good will.

2.—All of the above prejudices are kept alive and constantly in the minds of the Latin Americans by our European trade rivals, who by word of mouth and in the columns of the vernacular press lose no opportunity to misrepresent the American business man.

3.—That we are at present enjoying a large share of the Latin American trade through the accidents of the great war, but that much of it will return to European sources after the war, unless we correct wrong impressions prevailing throughout Latin America as to the intentions and ideals of the American business man.

4.—That sentiment and friendship are factors almost as important as price and quality in a business transaction with a Latin American.

The above conditions certainly are serious. The question which presents itself is—what are we going to do about it? There are some things to be done at home, and one is to create the strongest sentiment possible against anything like unfair dealing. There is abundant evidence that frequently when textile and some other products have been delivered to South American countries, they have not come up to the samples and in some cases there are strong reasons to suspect positive dishonesty. There should be the closest possible supervision of our foreign trade, and doubtless the federal trade commission could assist, but back of it all must be the insistent demand of reputable business men of the country that in dealing with foreign nations Americans must be even more careful than in selling at home, so as to avoid even the slightest suspicion of dishonesty.

While striving to correct at home anything that is unfair, we must do our utmost to show our South American friends that this country is not imperialistic, that its merchants with few exceptions are not dishonest, that we really wish to be friendly and promote their prosperity and that we believe in sentiment and friendship as factors in business relations. There must be publicity of a generous and intelligent kind and the manner of carrying on campaigns of publicity to bring about more friendly relations with the South American republics must be planned and executed by men of extensive experience, not only in journalism, but in dealing with the Latin-American peoples. We are not prepared to suggest details as to perfecting this enlightenment policy. Perhaps it would be well not to discuss the details publicly, but the American people must be shown the importance of doing something and doing it in a big way to correct anything in our dealings which may be fairly open to unfavorable criticism and to show the people of South America that the United States is genuinely friendly and anxious to trade on a fair basis.

Taxation in War Times

MANUFACTURERS and other business men with few exceptions have earnestly advocated the policy of preparing this country for any emergency that might arise and have done this with the full understanding that preparedness means large expenditures of money and energy. Hence they are not at all inclined to be captious in criticising any tax measure which may be passed by congress. They do not believe, however, that even at a time of great national emergency congress is justified in adopting measures that are inequitable. The tendency of congress naturally is to assess taxes upon a few rather than the many, because the collection is easier when few are assessed and the measure is likely to cause less opposition.

A measure, known as the excess profits tax, which has passed the house and is now before the senate finance committee, is being considered by many organizations of business men throughout the country.

THE OPEN HEARTH

It is a tax on such part of the net income of corporations and partnerships as is in excess of $5,000 and in further excess of 8 per cent of the actual capital invested. In other words, the corporation or partnership may deduct from the amount subject to taxation, first, $5,000, and then 8 per cent of the actual capital invested. Actual capital is defined in the bill as actual cash paid in, cash value at time of payment of other assets, and undivided profits and paid in or earned surplus used or employed in the business, not including money or property borrowed. Numerous objections have been made to the bill, of which probably the principal one is that it is discriminatory because it distinguishes between individual enterprise and corporate enterprise, although the taxed corporation would be compelled to compete with the exempted individual. For example, a man might sell as an individual enough machinery to give him a profit of half a million dollars and he would not be assessed at all under this bill, but if a company should make such a sale, it would be assessed on the basis above stated.

The measure also discriminates between agricultural and other industry, in that agricultural enterprises are exempted even when carried on by corporations. In view of the tremendous increase in the value of farm products, this exemption is indeed remarkable. Other objections to the bill are being urged and senators are giving assurance that it will be amended.

We believe that in making criticisms two things should be distinctly understood. *First,* that business men are willing to submit cheerfully to reasonable taxation and pay their full share, and *second,* that in objecting to certain provisions of the present bill they will make constructive suggestions as to how the bill could be improved. Such suggestions are now being formulated by leaders of the business world.

Trending in the Right Direction

AN INTERESTING sidelight on the present era of higher prices is thrown in a booklet just issued by the International Harvester Co. of America. It is written by George A. Ranney, treasurer of the International Harvester Co. of New Jersey, Inc. The title is "Readjustment of Values", and Mr. Ranney presents his conclusions in facts both in the text and in graphic form. The rise in prices of materials used in producing agricultural implements, in the selling price of these implements and in the prices received by the farmer for his crops all enter into the equation. He states the increase in prices started with the products of the soil and the circle now has been completed by the increased cost of the farmer's tools. While the circle was being completed, the farmer had the advantage of higher income from his crops before the higher prices on what he bought had reached him.

The statement is made that on the basis of normal production the increased expediture for labor materials on the part of the International Harvester Co. is $20,000,000 more than in 1914. Charts illustrate the rise of steel from $1.15 to $3 per hundred pounds, pig iron from $13.60 to $22 per ton, cotton duck from 32 to 65 cents per yard and lumber from $33 to $39 per 1,000 feet.

Perhaps the most interesting illustration is in the diagram showing the increased buying power of farm products. In 1910, it is shown that to buy $100 worth of farm implements the farmer spent 208 bushels of corn. In 1916, with an increase of 19 per cent in the cost of machinery, the farmer could buy the same machinery with 130 bushels of corn and had 78 bushels worth $66 as savings. At 20 per cent increase in cost, the same implements would cost the farmer 141 bushels of corn, leaving 67 bushels worth $57 as surplus. At 30 per cent added cost of implements, the cost of the same tools would be 153 bushels of corn with 55 bushels worth $47 as a surplus. The same illustration is shown in the case of oats and wheat.

In conclusion, Mr. Ranney calls attention to the present movement to put the implement trade on a cash basis. He states that the farmer receives cash for all he sells. Formerly the implement maker has extended long credit and has acted as banker for the farmer. In the general tendency toward a cash basis, the International Harvester is taking its part. Advantage provided by the federal reserve banking system with its possibilities for discounting promissory notes give much more value to this paper than to a book account. To place the implement business on a cash basis will reduce the general liability and make profits more certain without putting a burden on the buyer. This is a decided change for the better for various reasons, one of which is that it will probably encourage the buying by agricultural implement manufacturers of steel bars for half-year requirements instead of for a full year and the putting of those buyers on the same basis as other large buyers in regard to prices.

Capt. Robert Dollar says that he doesn't see a shoemaker when buying a suit of clothes. Lloyd George, with the same restricted viewpoint, appoints an experienced ship builder to solve England's shipping problems. With Mr. Stevens, New England farmer and "lame duck", just appointed, our shipping board includes a farmer, lumberman, railroad man, and one practical shipping man.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products February 14, average for January, 1917, average for November, 1916, and average for February, 1916. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Feb. 14, 1917.	Aver. for Jan., 1917.	Aver. for Nov., 1916.	Aver. for Feb., 1916.
Bessemer pig iron, Pittsburgh	$35.95	$35.95	$30.35	$21.45
Basic pig iron, Pittsburgh	30.95	30.95	25.95	18.77
No. 2 Fdy. pig iron, Pittsburgh	33.95	31.95	26.75	19.51
Northern No. 2 Fdy., Chicago	32.00	30.00	25.00	18.50
Lake Superior Charcoal, Chicago	33.75	33.75	21.95	19.50
Malleable, Chicago	32.00	30.00	25.00	19.00
Southern No. 2, Birmingham	24.00	23.00	19.60	14.63
Southern Ohio No. 2, Ironton	31.00	30.00	24.00	18.00
Basic, eastern Pa.	30.50	30.50	25.50	19.50
No. 2X Virginia furnace	29.00	26.50	23.75	18.00
No. 2X foundry, Philadelphia	31.50	30.50	25.25	20.00
Ferro mang., delivered	250.00	175.00	155.00*	140.00*
Bessemer billets, Pbgh.	65.00	60.00	52.00	34.00
Bess. sheet bars, Pbgh.	65.00	60.00	52.00	34.00
Op.-h'th sh. bars, Pbgh.	65.00	60.00	52.00	35.00
Open-hearth billets, Pbgh.	65.00	60.00	52.00	35.00
Steel bars, Pittsburgh contract	3.00	2.975	2.78	2.01
Steel bars, Chgo.	3.19	3.19	2.89	2.23
Iron bars, Philadelphia	3.159	3.159	2.659	2.259
Iron bars, Cleveland, local del'y.	3.00	3.00	2.70	2.29

*Seaboard.

	Prices Feb. 14, 1917.	Aver. for Jan., 1917.	Aver. for Nov., 1916.	Aver. for Feb., 1916.
Iron bars, Chgo. mill	$3.00	$3.00	$2.52	$1.91
Beams, Chgo. contr.	3.44	3.29	3.03	2.22
Beams, Pittsburgh, contr.	3.25	3.075	2.88	2.03
Beams, Philadelphia	3.409	3.509	3.109	2.209
Tank plates, Pbgh., contr.	3.75	3.575	3.35	2.13
Tank plates, Chicago, contract	3.94	3.98	3.46	2.33
Tank plates, Philadelphia	4.909	4.909	4.159	2.659
Sheets, blk., No. 28, Pbgh.	4.50	4.56	3.67	2.60
Sheets, blue anl., No. 10, Pbgh.	4.50	4.125	3.30	2.61
Sheets, galv., No. 28, Pbgh.	6.50	6.56	5.07	4.75
Wire nails, Pittsburgh	3.00	3.00	2.85	2.22
Connellsville fur. coke, contr.	8.00	7.25	3.75	2.50
Connellsville fdy. coke, contr.	6.50	6.375	8.60	3.75
Heavy melting steel, Pbgh.	22.00	23.25	20.55	17.37
Heavy melting steel, eastern Pa.	19.50	21.50	19.50	16.50
Heavy melting steel, Chgo.	22.00	20.25	19.35	15.25
No. 1 wrought eastern Pa.	27.00	26.50	24.00	22.50
No. 1 wrought, Chgo.	24.50	23.75	21.25	14.95
Rerolling rails, Chgo.	25.50	27.25	24.90	17.12
Car wheels, Chgo.	18.25	19.75	15.95	14.06

(For Additional Prices See Page 448.)

Embargoes Force Spot Pig Buying

Many Consumers of Steel Making and Foundry Grades in Pittsburgh and Eastern Districts Buy Iron While Contract Shipments Wait on Side Tracks—Basic Sells at $32.50, Tidewater

Pittsburgh, Feb. 13.—Driven into the market by railroad embargoes and congested traffic conditions generally, many consumers of steel making and foundry irons have been buying for immediate shipment. Sales of basic pig iron have been made at a rather wide range in price; this is due largely to the fact that sellers are forced to confine their activity to limited territory, by reason of abnormal transportation conditions.

The Allegheny Steel Co., Brackenridge, Pa., and the Carbon Steel Co., Pittsburgh, each has closed for about 1,000 tons of standard basic iron. The former concern obtained its tonnage at $30.75, delivered, or 20 cents below the generally prevailing price. The Carbon company, it is said, shaded the $30 price slightly. On the other hand, several lots of basic iron have been sold at above $30, valley. In fact, a small tonnage of off-basic iron commanded $31, valley, a few days ago. The Central Steel Co., Massillon, O., is reported to have closed for 10,000 tons of basic for second quarter shipment. The United Alloys Steel Corporation, Canton, O., is negotiating for 5,000 tons of basic iron for shipment before July 1.

Bessemer pig iron is selling at $35 to $36, valley. Several blocks of this grade have commanded the latter figure for nearby shipment, and some dealers say no iron is available at less than $36, valley. As previously pointed out in these columns, people in close touch with the situation believe a shortage of approximately 3,000,000 tons of bessemer ore may develop this year, which would mean a shortage of about 1,500,000 tons of iron.

Several dealers are asking $35 and $36 for foundry and malleable irons and some tonnage for immediate shipment has been sold at both prices. Sales, however, have not involved enough tonnage to test quotations severely. As has been the case for many weeks, numerous blast furnaces in the central west have been banked, on account of the slow movement of coke. The Carnegie Steel Co. on Saturday had 20 furnaces on the inactive list; 15 of these were banked for want of coke.

Gun Makers Buy Low Phosphorus

Philadelphia, Feb. 12.—Whether caused by the talk of higher prices in the event of war, or not, increased buying of iron has sprung up in this district. The spurt has resulted in a fair volume of sales both for spot and for forward delivery running through the last half. In some quarters it is thought that a last half buying movement is developing. Some of the spot buying continues to be brought about by the failure of makers to keep up their shipments. Export business has figured prominently in the week's turnover, particularly the sale of 20,000 tons of 0.20 per cent phosphorus basic by a Harrisburg steelmaker to Italian buyers at a price to the buyer of higher than $32.50, tidewater, or the equivalent of close to $32, furnace. The sale was made through middlemen. Delivery is expected to start in April. Japan, Canada and other foreign countries are in the basic market, the former for 3,000 tons. An additional sale of 1,000 tons of standard eastern Pennsylvania basic for immediate shipment was made to a Pottsville, Pa., steelmaker at $30, furnace. Recent hurried inquiries for low phosphorus iron from munition works who have been or are likely to be recipients of government orders has resulted in the purchase of 5,000 to 10,000 tons of standard iron for this

(*For complete prices see page* 448)

year by the Bethlehem Steel Co. A considerable portion of this business went at $57.62, delivered. One maker quoted slightly below $63, delivered, on this order. Another eastern munition plant is in the market for a small amount. Standard low phosphorus now is quoted higher at $58 to $60, Philadelphia. Makers will be obliged to divert some iron from other contracts in order to fill government business. The last sales of Lebanon low phosphorus were at $55, furnace, and on a small lot for government navy yards, $59, furnace, was named. A Trenton buyer has closed for 1,000 tons of last half malleable. The receivers of the Standard Cast Iron Pipe & Foundry Co. want 5,000 tons of forge and No. 3 for the best delivery. Foundry iron prices in eastern and central Pennsylvania still fill the spread of $30 to $32, furnace, for No. 2X. The Virginia market is stronger. A maker who has sold upwards of 15,000 tons of foundry iron recently for last half at $27.75, furnace, for No. 2X, has advanced to $29.50 for No. 2X and $29 for No. 2 plain. A maker of high silicon also has advanced to $29.50, furnace. Another furnace will sell only in a limited way at $29, furnace.

Heavy Export Buying

New York, Feb. 13.—Foreign governments have been the buyers of additional large blocks of steel-making iron and the total of these transactions closed during the past week or 10 days has been not less than 100,000 tons. Italy has been the principal buyer and the French government has added considerable tonnage to its previous purchases. Most of the tonnage has been bessemer for delivery beginning April and has been closed at prices of about $36.50 to $37, tidewater. The Wharton, N. J., furnaces, which have figured liberally in these sales, have an export freight rate of 63 cents to tidewater. There was also a 20,000-ton sale of low phosphorus basic to Italy by an eastern Pennsylvania steelmaker at over $32.50, seaboard, shipment to begin in April. The furnaces in making these sales are taking no chances on the railroad shipment. Delivery is made f. o. b. furnace, and the freight to tidewater is prepaid. The buyers are to furnish the vessels. Scarcity of ship space has become so acute that some houses which have been selling freely in the past, now have dropped export matters for the present. A quotation of $55, from the south to Genoa, was made in the week. New foreign inquiry is as vigorous as ever. Outside of negotiations being carried on directly by various governments, 50,000 tons easily are pending. Portugal has asked 5,000 to 10,000 tons of low phosphorus, Japan 3,000 tons each of low phosphorus and basic, and Sweden wants additional foundry iron. Domestic buying has been a little livelier. A Fitchburg, Mass., consumer closed for 2,500 tons of foundry for last half; an Albany stovemaker has been figuring on 3,000 tons, and an inquiry for 1,000 to 2,000 tons for a Connecticut point is out. There is more inquiry for charcoal, which is scarce. Small sales of eastern Pennsylvania No. 2X at $32, furnace, were made in the week. A Virginia maker, who advanced to $29.50, furnace, for No. 2X for last half, has sold at the new basis.

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Embargoes Hit South

Birmingham, Ala., Feb. 13.—Small lot sales of pig iron are still being recorded in the Birmingham district. The freight traffic situation places a heavy drag on the industry in the south. Embargoes are encountered in almost all directions and special permits must be sought in order to deliver a few cars of iron. Many cars of export iron are accumulating at the southern ports, awaiting ship space. There has been some reduction of accumulated stocks in the south. Estimates of the amount on furnace yards, including a little warrant iron, place the total around 200,000 tons. The make is at a maximum pace and while one furnace is banked because of the short coke supply, there is a big production. Alabama's output went nearly 250,000 tons in January. Of course, with three days difference this month and other obstacles in sight, the same production is hardly to be expected.

Pig iron manufacturers in the south are making but little effort to get business for last half delivery. Quotations are given now at $24 to $25 per ton for No. 2 foundry, first half and immediate delivery and $23 to $23.50 for the last half. Chattanooga disposed of a little iron recently under $23, but the tonnage was not very great. The local melt of pig iron promises to be heavy from now on. Cast iron pipe makers in particular are bidding on large contracts throughout the country with good prospects.

One Buffalo Stack Banks

Buffalo, Feb. 13. — Severe weather conditions and congestion in the yards of trunk line railroads, accentuating the shortage of cars and labor, are serious factors in the pig iron situation in the Buffalo district. Motor trucks are being pressed into service to carry small lots of coke and iron to foundries on the ragged edge of complete shut-downs. The long prevailing high prices of fuel and iron have caused many melters to become overcautious and as a result they are being pinched hard as the present situation continues. Short buying and delayed shipments in transit have created a steady stream of inquiries for foundry and other grades, particularly in small lots for immediate needs.

Furnaces are feeling the effects of weather conditions and the unprecedented railroad situation. One stack in the Buffalo district was compelled to shut down Monday through lack of coke. It is stated that three train loads of coke for this furnace interest, delayed in transit, were blocked but a short distance from destination on account of the heavy snow. Charcoal iron of any grade is scarce and is held at a premium. Small lots are available at $37.50 to $40, according to the grade and analysis.

Traffic Tie-Up Stalls Pig Iron

Cleveland, Feb. 13.—The traffic situation occupies the center of the stage in the Cleveland pig iron market. The cold weather of the past few days has put the railroads in a worse situation than ever before. Coke shipments to furnaces in some cases have practically ceased and shipments of the finished product to consumers have been virtually at a standstill. Inquiry is fairly heavy. It undoubtedly would be larger were it not for the fact that most consumers are familiar with the furnace situation and are aware that there is comparatively little free first-half iron remaining. Western Ohio furnaces report sales aggregating some 5,000 tons during the past week at $33, furnace. Some

(*For complete prices see page* 448)

of this iron is for shipment into Michigan.

Chicago Market Advances

Chicago, Feb. 13.—An advance of $1 per ton on northern and southern pig iron of foundry and malleable grades is in effect and such strength is exhibited by the market that further increases are deemed imminent. Northern sellers are asking $32, furnace, for foundry and malleable, and sales have been made at that figure in small tonnages. In fact, inquiry is confined mostly to small lots, and the total is not large.

Southern iron has advanced and it appears that most makers now are asking $25 for all grades for all deliveries. Previously prompt iron was a dollar lower and second half was $2 under this figure. While it is not certain that $24, Birmingham, could not be done in some quarters, it is believed that $23 has disappeared entirely. Most buying is for spot delivery and cars arriving for the account of brokers are placed immediately on arrival.

Low phosphorus iron is quoted by one seller at $56.50, eastern furnace.

Market Fairly Active

St. Louis, Feb. 13.—The buying movement in pig iron which has been expected in this district, has not yet started. The market, however, is fairly alive with small orders, including one for 200 tons of southern foundry No. 2, for delivery over the second quarter, and one for a small lot of ferro-manganese. Ferro-manganese has risen to $250 a ton in this market. Prices are firm, and southern No. 2 is held at $24, Birmingham. Chicago iron is quoted at $32, and Ohio iron at $32, Ironton.

Cast Pipe is Slow

New York, Feb. 13.—Makers of cast iron pipe in the east are watching closely the course of the pig iron market and any appreciable advance in iron will be followed quickly by the announcement of higher schedules on pipe. Already some makers have the question of higher prices under serious consideration but no official announcements have been made. New buying still is along moderate lines although some of the water and gas companies are in the market for good quantities. The only public letting before makers is 600 tons for Buffalo upon which bids are being taken today. Export inquiries are numerous and those actively in the market today total probably 5,000 to 10,000 tons. These matters usually drag along so that producers lack faith in their early closing.

Pipe Buying Light.

Chicago, Feb. 13.—Inquiry for cast iron pipe on the part of cities continues backward and little is being figured. Bids were opened Feb. 5, at Springfield, Ill., but no award has yet been made. Figures were to be opened at Columbus, O., Feb. 12, on the season's requirements, and bids will be opened at Rockford, Ill., Feb. 15, on 400 tons. Prices remain steady at previous quotations.

Export Rail Inquiry

Is Very Heavy in East—Shortage is Now Feared

New York, Feb. 13.—Clear indications of a shortage of steel rails are given in the continuing active inquiry which is coming to American mills from all parts of the world. The largest tonnage in sight is that for French railways. While the preliminary negotiations that have been opened have not stipulated any definite amounts, the makers have been given to understand that they have a chance for as much as the open mill space will allow. They have been asked to indicate what tonnage of 90-pound sections they will be able to offer in the near future. One maker has been figuring on 75,000 tons. An English railroad continues in the market for 50,000 tons; a Cuban line, for 10,000 tons, and 12,000 tons are wanted for Denmark; 2,000 tons for Porto Rico and various amounts for other countries. Canadian roads would take a large tonnage and Russia remains a receptive buyer of a heavy quantity, pending financing.

Rail Sales Light

Chicago, Feb. 13.—Sales of standard steel rails continue in small lots and approximately 25,000 tons were sold last week in the west. This includes several lots of 4,000 to 5,000 tons each, supplementing previous heavier purchases. The United States government, which recently bought 10,000 tons for use in Alaska, is about to place the second order of about the same size for the same purpose. An unusual inquiry for tie plates is being entertained, 26,000 tons having been asked for recently, of which something over 5,000 tons have been placed. The remainder consists of two fairly large inquiries. Car buying is practically absent, and no sales were made in the western territory during the past week.

Evan F. Jones, treasurer and general manager of the Morgan Spring Co., Worcester, Mass., has been elected president of the Norcross Bros. Co., general contractors, Worcester. This company built the New England building, Cleveland.

(*For complete prices see page* 448)

New Gun Shop

For Bethlehem Steel Co. Will Make 16-inch Rifles

New York, Feb. 13.—Official announcement is made by the Bethlehem Steel Co. that it has work under way on an important new department of its Lehigh works at South Bethlehem, Pa., to manufacture the 16-inch, 5 caliber guns designed by the United States army and navy for coast fortifications and for battleships. The manufacture of these large guns has raised new problems for the makers growing out of the increased size of the ingot and the special annealing, tempering, shrinking and machining requirements. The Bethlehem Steel Co. is arranging in the open hearth department of the Lehigh plant to produce ingots weighing, including discard, approximately 150 tons for the larger size tubes or jackets required for these guns. The manufacture of these ingots requires especially large ingot molds and handling facilities. To take care of the physical properties of the steel, an annealing and heat treatment department, equipped with nine large annealing and heat treating furnaces, varying in size from 24 to 90 feet in length and eight feet in width, is about to be installed, with the necessary oil and water baths, strengthening presses, pumps, etc.

Details of Shop Equipment

The main gun shop will be approximately 460 x 95 feet. Adjoining will be a building 115 feet wide by 240 feet in length for housing the furnaces. The assembling of the guns presents an unusual problem in handling. A 175-ton crane will be required for lifting the combined weight. The heating for the oil tempering and shrink fits in the assembly of the gun will be accomplished in a vertical furnace approximately 90 feet in depth. An oil tank of similar depth will be required. This building will be 165 feet in height, with furnaces, tanks, shrinkage pits, etc., extending 55 feet below grade, to accommodate the great length of the gun.

For machining and rifling a machine shop, 180 x 700 feet, will be required. This will be capable of machining two of the larger size guns per month. The equipment required will be of extra large size as illustrated by the fact that the boring mills for tubes and liners will be 195 feet in length by approximately 12 feet in width. Work has been started on the new departments and will be completed as fast as possible.

Shell Makers Deal Direct

French Munition Producers Hope to Speed Up Semi-Finished Steel Deliveries—Steel Scarce East and West

Philadelphia, Feb. 13.—Eastern makers have received an inquiry for 400,000 to 450,000 tons of shell steel from France for delivery during the current year. This inquiry comes from French munition works direct and not from the French government and it is understood to be an effort of the former to get quicker deliveries of steel by dealing direct with the mills rather than to take their material through the state authorities. It is doubted whether anything will develop from the proposition owing to the fact that such a tonnage is not obtainable from producers. Eastern mills continue to return the same report that they have practically no semi-finished material for sale, despite the active inquiry, much of which is for export. Prices are around $65, mill, for rerolling, while for forging billets $85, mill, is said to be obtainable readily.

Billets and Sheet Bars Reflect Strength

Pittsburgh, Feb. 13.—Manufacturers of billets and sheet bars have had no difficulty in obtaining $65, mill, for shipment in the second quarter of the year. Virtually all the tonnage available for delivery in that period already has been sold, and no trace of sales below $65 can be found. Many consumers have been unable to cover estimated requirements for April, May and June, and it is not unlikely that prices will be advanced to $70, mill, at an early date.

Many batteries of open hearth furnaces have been idle, on account of the shortage of gas. Virtually every mill in this district dependent entirely upon the gas supply has been operating only in part this month. Consumers of semi-finished steel are complaining about deliveries, which have compelled some concerns to suspend operations.

Few Sheet Bars to Be Had

Youngstown, Feb. 13.—The sheet bar interest offering semi-finished steel at $65 a ton for second quarter, and, where the demand is insistent enough, for last half, declares that the finishers, despite their unwillingness to pay that price for future material, are contracting, and for substantial tonnages. According to all the information available, the $65 figure, quoted flatly and as an irreducible minimum, cannot be shaded anywhere in the valley. Bars are hard enough to get at that price.

Big Shell Steel Inquiry

New York, Feb. 13.—Nothing has developed from a recent inquiry for 400,000 to 450,000 tons of shell steel which has been put into the market by French works, independently of the French government. The sizes wanted are from about 3-inch rounds to 6-inch square billets with rounded corners, for the 75 and 155-millimeter guns. Serious doubt is expressed whether this tonnage can be obtained from the American works this year. There is also a new 10,000-ton inquiry for steel from French sources. The Republic Iron & Steel Co. has received an order for 50,000 tons of large rounds from British buying representatives at a reported price of 4.50c, mill, per pound. It is stated that this steel is to take the place of material sold by England to Italy.

Shops Burned

Union Switch & Signal Sustains Heavy Loss—Will Rebuild

The machine and assembling shop of the Union Switch & Signal Co., Swissvale, Pa., were swept by fire, Feb. 10, entailing a loss estimated conservatively at between $4,000,000 and $5,000,000. The machine shop, built in 1886, covered 450,000 square feet. It contained the pattern shop, assembling and packing departments, experimental laboratories and an emergency hospital. Patterns said to be worth about $1,000,000, were destroyed. The power house, iron foundry, brass foundry, forge shop, office building, and several small buildings owned by the company for the manufacture of shells, were threatened by fire, but none of them was damaged. A. L. Humphries, president of the company, states that the machine shop will be rebuilt at the earliest possible date.

The company recently completed a large contract for shells, 2,000 of which were stored in the machine shop. These likely were damaged by the fire, officials said. Officials of the company say the fire originated in the packing room; they claim it was not started by an incendiary.

The Ohio Forge Co., Cleveland, will erect a new plant on a recently purchased 4-acre site located on E. Ninety-second street between Woodhill and Kinsman avenues. The entire plant has been estimated to cost $100,000 and will be completed in the latter part of the summer. The main building will primarily be made 70 x 150 feet, but the length will be doubled at a later date. Upon the completion of the new structure, the company will abandon its present site on East Sixty-fifth street and will move its entire equipment to the new location. The company does not plan at the present time to enter any new field of manufacture, but expects to continue the manufacture of general forgings and drop forgings. The Burchard-Roberts-Wales Co. is architect and engineer.

(*For complete prices see page* 448)

Pipe Prices Up

Butt and Lap Weld Advanced $4 a Ton—Demand Heavy

Pittsburgh, Feb. 13.—Several independent manufacturers of tubular goods today advanced prices of standard butt and lap weld black and galvanized steel pipe two points, or $4 a ton, and quotations of oil country goods have been put up proportionately by most makers. The last previous general advance in the price of tubular goods was made Dec. 30, 1916. Some manufacturers of iron pipe today are sending out cards, showing advances similar to those announced by makers of welded steel material.

Demand for butt and lap welded pipe is heavy. Jobbers in all sections of the country are specifying briskly for pipe 3 inches and under in diameter. This material is being used by industrial and commercial interests.

Several attractive inquiries for oil country goods are pending. These include 65 miles of 20-inch and 100 miles of 8-inch for southwestern shipment, and involve about 100,000 tons. An order for 25 miles of 8-inch steel line pipe was placed a few days ago. Demand for boiler tubes continues extremely active and premium prices are being paid frequently for prompt delivery.

Galvanizing Co. Expands

The Pittsburgh Galvanizing Co., after April 1 will occupy buildings formerly used by the Independent Bridge Co., Beaver avenue, North Side, Pittsburgh. The Galvanizing company has completed plans for the installation of new galvanizing equipment, including three large kettles, a 5-ton overhead Whiting crane, four jib cranes and necessary auxiliary apparatus. The Independent Bridge Co. is operating a plant at Neville island.

Plates for War and Peace

Government Demands Speed Up Mills—More Cargo Boats Let in East and West

Philadelphia, Feb. 12.—Increased activity in the placing of new contracts for merchant vessels with domestic yards is showing its effect in various inquiries in the east for plates and other ship materials. The Morgan line recently closed contracts for six 10,000 to 11,000-ton freight and passenger boats. From the Pacific coast comes the report that three of the ships recently sought on this side by English shipping interests, previously referred to, have been placed at San Francisco. Two Pacific coast ship yards have issued new inquiries for the plates for two vessels each. One inquiry calls for 6,600 and the other for 6,000 tons. Other domestic ship tonnage is coming out. The French government through J. P. Morgan & Co. have come out as a direct buyer of a new lot of ship steel, asking for about 12,000 tons, of which 7,500 tons are plates. Another new export inquiry for ship steel is for 2,000 tons. Eastern mills continue to be fairly overwhelmed with new inquiries for plates from practically all classes of buyers, both at home and abroad, and they are disposed to quote only on a small fraction of this business. The rush of demand has been intensified by the warlike situation that has developed between this country and Germany, which seems to have had the effect of hurrying forward these propositions. One large eastern producer who has been holding ordinary tank plates at 4.75c, Pittsburgh, is advancing his schedule to 5c, Pittsburgh. For ship plates, Lloyds specifications, 6c, Pittsburgh, remains the usual price asked. Some consumers are reporting the receipt of instructions to get out government work with the utmost dispatch, and they are pressing the mills for prompter deliveries of material.

More Boats Closed

New York, Feb. 13.—Increased activity in the closing of boat contracts by American builders is noted. The Union Iron Works, San Francisco, has closed for two vessels and the Fore River Ship Building Corporation also has taken two additional.

Freight Situation Acute

Pittsburgh, Feb. 13.—Manufacturers of such products as plates, shapes and bars are seriously handicapped, because of congested traffic conditions, which are making it increasingly difficult to meet specifications for delivery. Some of the larger mills have fully 50,000 tons of material standing on track or on shipping platforms, awaiting the arrival of cars or locomotive power. Traffic managers describe the situation as worse than ever. It has been suggested by several railroad officials that manufacturing plants suspend operations for a week, to enable the railroads to clear their tracks. Such a plan, it is believed, would not be successful, unless directed by the government.

Specifications for plates show no diminution in volume, although new buying is not so heavy as it was 60 days ago. This is not surprising, however, in view of the sold-up condition of the mills, most of which cannot meet additional obligations until the latter part of the year. Manufacturers are asking from 3.75c to 4c for delivery at their convenience. For shipment within 60 or 90 days some mills are quoting 4.50c and above.

Plate Demand Insistent

Chicago, Feb. 13.—Buyers of steel plates, especially for ship building, continue to besiege the market and are anxious to make contracts for any length of time that the mills will accept. Offers have been made for contracts extending over three years, but these have not been booked. The present quotation is 3.94c, Chicago mill, for remote delivery, but the price for prompt delivery is 5c, Chicago, and in some instances even higher prices have been obtained.

Pipe Advances

Pittsburgh, Feb. 14. (By wire.)—Following advances of $4 a ton made yesterday by several manufacturers of steel and iron pipe, the National Tube Co. today put up prices of standard butt and lap-welded black and galvanized steel pipe two points, or $4 a ton, and similar advances were announced by the A. M. Byers Co. affecting wrought iron pipe. Oil country goods, including tubing, casings, line and drive pipe have been advanced proportionately. The last previous general advance in prices of welded material was made Dec. 30, 1916, when quotations were advanced $4 a ton.

Fairly heavy demand exists for all grades of pig iron. Foundry iron has sold as high as $38 a ton and one maker is asking $40, valley, for spot delivery. The bulk of the tonnage, however, is being sold at $33 to $35, valley.

(*For complete prices see page* 448)

Bars Not So Active

Due to Congested Railroads and Fuel Shortage—Prices Firm

Pittsburgh, Feb. 13.—The market for steel bars is not nearly so active as it was 60 days ago, although mills have not been able to catch up in deliveries. This is due largely to congested traffic conditions and the shortage of fuel. Steel bars are firmly held at 3c for delivery at the convenience of the manufacturer.

Nothing New in the East

Philadelphia, Feb. 12.—Nothing of interest has developed in steel bars which are inactive on new business but are being specified freely. Some of the larger consumers in this district continue to be prospective buyers of tonnages if they could obtain quotations for the deliveries desired. Independent makers are not going below 2.50c, Pittsburgh, and this appears to be the virtual minimum of the market.

Open 1918 Books

Chicago, Feb. 13.—Strong pressure is being brought to bear on steelmakers to accept contracts for finished steel for delivery during the first half of next year. Already contracts have been taken for plates and shapes on definite projects, but indications are seen that leading makers will shortly begin general selling for the first half of 1918. The demand for steel bars is strong, although less than for other finished products. The quotation remains steady at 3.19c, Chicago, for remote delivery, and premiums run many dollars per ton higher for prompt delivery. Hard bars rerolled from rails are quoted at 3c, Chicago mill, with prospects of a higher quotation before long.

Specifications Lighter

Cleveland, Feb. 13.—Specifications show some falling off compared with the first full week in February. In some quarters this is attributed to the uncertainty surrounding the international situation, buyers preferring to wait until relations with Germany are on a more clearly defined basis. Prices remain unchanged.

Bar Iron is Steady

Chicago, Feb. 13.—Bar iron makers continue to quote 3c to 3.10c, Chicago.

The demand is not heavy, as most consumers are covered through the first half and mills are booked further ahead than usual. Some inquiry is being received from railroad and automobile manufacturers who have not formerly been consumers.

Hoops and Bands Unchanged

Pittsburgh, Feb. 13.—The market for hoops and bands is unchanged. Specifications against contracts are coming out in heavy volume and new demand is fairly active. The Carnegie Steel Co. continues to quote hoops at 3.50c and bands at 3c for delivery at its convenience. Several other manufacturers, in a position to meet specifications for prompt delivery, are obtaining 4c and above.

Shafting Stiffens

Pittsburgh, Feb. 13.—The 20 per cent off the list price of cold rolled steel shafting now is being offered only in isolated instances. Most manufacturers are refusing to shade 15 per cent off the list for delivery at their convenience. Specifications against contracts are heavy and new demand is fairly active. Some manufacturers are taking emergency orders, believed to have been created by the break in diplomatic relations with Germany.

Wire Prices Unchanged

Pittsburgh, Feb. 13.—Contrary to the expectations of the trade, prices of wire products have not been changed since Nov. 24, 1916. Specifications against contracts continue heavy and some new demand is reported. The general market, however, is not nearly so active or excited as it was 60 days ago. Some of the larger jobbers have enough material under contract to meet demand for spring distribution, and it is not unlikely that a new buying movement will not be enjoyed until the jobbing trade covers its needs for the summer months. Prices of wire products remain on the basis of $3 a keg.

Wire Demand Heavy

Cleveland, Feb. 13.—Prices of wire products remain unchanged. Nails are being quoted on a basis of $3 a keg. Local producers are sold far in advance and inquiries even for large tonnages create hardly a ripple on the surface. Specifications are satisfactory.

D. A. Wolff, formerly associated with the Farrar Advertising Co., Pittsburgh, now is advertising manager of Jas. H. Matthews & Co., Pittsburgh, manufacturer of steel stamps, dies and marking equipment.

Auto Makers Want Sheets

Inquiry for 10,000 Tons Appears in Philadelphia—Valley Makers Sewed Up by the Railroads

Philadelphia, Feb. 12.—An automobile manufacturer has inquired of mills in this territory for 10,000 tons of sheets. The demand for sheets upon eastern mills is keeping up actively and the market is very strong. For No. 10 blue annealed 4.50c, Pittsburgh, or 4.659c, Philadelphia, is the absolute minimum and quotations run up to 5c, Pittsburgh. Production is below expectations and this makes it more difficult to meet requests for deliveries.

Sheet Demand Insistent

Pittsburgh, Feb. 13.—Several consumers of steel sheets, in dire need of tonnage, have attempted to buy carload lots for shipment by express. So far as can be learned, however, none of the mills in this district are in a position to offer sheets for nearby delivery. Mill managers daily are receiving telephonic and telegraphic requests for spot delivery to all sections of the country. Railroad embargoes have made it virtually impossible to ship finished products to Canada, and it is reported that several Canadian interests have been forced to close down plants because of deferred deliveries.

Prices of steel sheets are hardening all along the line. Blue annealed products firmly have been established at 4.50c as a minimum and considerable tonnage has been sold at as high as 5c, base. Black sheets are selling at 4.50c to 5.60c for No. 28 gage, and galvanized sheets are commanding 6.50c to 7c, base. The Ford Motor Co., Detroit, has purchased material for shipment after July 1, but other automobile makers have not covered their requirements for the third or fourth quarters of the year.

Clamoring for Cars and Coal

Youngstown, Feb. 13.—Unless there is speedy relief in the coal situation in the Mahoning valley, shutdowns of sheet mills at the end of this week or early next week hardly can be averted in the opinion of manufacturers. Even the larger companies have only enough fuel to last from day to day. This state of affairs is coupled with a continuing and constant demand for sheets of all grades. The market has hardened still further.

Representative quotations are about as they have been for weeks past; black sheets, 5c to 5.50c; blue annealed, 4.25c to 4.74c; galvanized, 6.50c to 7.50c. These prices are for bessemer. It is almost impossible to get open hearth, and when an odd lot may be had, the ordinary 10-cent differential is not likely to figure.

(*For complete prices see page* 448)

An inquiry for 1,000 tons of black sheets for commercial purposes in the far east is going the rounds, but as yet no takers have been reported. Manufacturers continue to take only such business as is especially attractive to them individually.

Practically all of the finishing mills are fairly well supplied with sheet bars, and are in better condition in this respect than they have been. The larger producers make their own bars; comparatively little is sold out of the valley.

The worst problem, faced alike by the large producer and the smaller, is lack of coal and inability to get sufficient fuel to assure a safe margin. "It is the worst problem ever faced by the steel business," said one official today. His company, whose regular contracts for coal would seem to have placed it in excellent position, has been compelled, since the traffic situation became acute, to buy 300,000 tons of coal from other sources for delivery as soon as possible.

Supplies of chemicals, particularly sulphuric acid, are very low. Two weeks ago chemicals were causing more apprehension than coal and coke. There is no general change as to embargoes. Details affecting various companies and various kinds of shipments are changed almost every day.

Sheets Are Scarce

Cleveland, Feb. 13.—Sheet prices are firm on a basis of 4.50c to 5.60c, Pittsburgh, for No. 28 black and 4.50c to 5c for No. 10 blue annealed. Tonnage is scarce in the Cleveland market and owing to the traffic situation, local sellers are unable to handle much business at the present time.

John C. Williams, assistant to the president of the Phillips Sheet & Tin Plate Co., Weirton, W. Va., has been elected third vice president of the company, in charge of the operating department. Mr. Williams has been connected with the Phillips company since its incorporation, about 11 years ago.

Big Shape Orders in East

Government Has Taken Bids for 8,000 Tons for Military Structures —Buyers Meeting With Increased Difficulty

Philadelphia, Feb. 12.—Buyers of shapes are meeting with increased difficulty either in finding mill space for new purchases or in getting scheduled deliveries against old orders. Most makers are behind on their shipments, due to reduced output, car shortages, etc., some of them so much so that certain fabricating shops, which are their customers, are in trouble to keep up their operations. Makers continue reluctant to make new sales since their active obligations from month to month are showing little change, and they feel they have all the orders they can handle. Some eastern mills on sizeable business offered them this week declined to make any promises for this year. There is considerable inquiry current for ship shapes which are not easy to get for many months, even at 4c, Pittsburgh. The French government has out a direct inquiry for about 4,000 tons and a 2,500-ton and other domestic lots are seeking a seller. Bids are going in today on about 8,000 tons of work for the government, including 78 Norfolk navy yard crane runways and a hanger at Pensacola, and have been taken on 6,000 to 8,000 tons from the Kelly-Springfield tire plant at Cumberland, Md. No award of the 8,000 tons of Philadelphia Subway Steel has been made. Eastern mills quote plain shapes from 3.25c to 3.50c, Pittsburgh.

Fabricators Handicapped

Pittsburgh, Feb. 13.—Fabricators are complaining about the inability of railroads to move material. Construction work in many instances has been brought to a complete standstill by the deferred shipment of fabricated steel. Bids have been taken on about 6,000 tons of material for the United States navy yards at Norfolk, Va. Structural shapes are being firmly held at 3.25c for delivery at the convenience of the maker.

Fabricators Trying to Buy

Cleveland, Feb. 13.—Specifications are somewhat lighter. Mills, however, are sold so far ahead that temporary fluctuations in demand have no effect whatever on the market. Buyers have reached the stage where they are willing to accept almost any conditions that may be imposed. An inquiry for 1,000 tons for miscellaneous structural material for a Cleveland fabricator is going begging. Fabricating shops throughout northern Ohio are having difficulty in maintaining their stocks at a normal point.

Western Structural Buying

Chicago, Feb. 13.—Structural tonnage placed recently in the west involves one mercantile building. The Central Iron Works took 918 tons for a bank and office building for the American National bank, San Francisco. This is rather unusual in the west. Another western project calls for 900 tons for bridges for the Western Pacific railroad, which will be fabricated by the McClintic-Marshall Construction Co.

Heavy Contracts Pending

New York, Feb. 13.—Government work, which has been hurried to the front within the past week or two now has been bid upon by fabricators. On the 7,500 tons for two crane runways at the Norfolk navy yard, the McClintic-Marshall Co. is the low bidder, offering the complete erection in 300 days. The American Bridge Co. offered 270 days. On a dirigible baloon hangar at Pensacola, Fla., 500 tons, the Virginia Bridge & Iron Co. is low with the delivery fixed at about 180 days. No date yet has been set for bids on a crane runway for the Bremerton, Puget Sound, navy yard. January showed a very favorable total in new contracts for fabricated work. Nevertheless, there has been a disposition to delay awards, at the present costs and deliveries, and the pending tonnage is increasing. Some of the larger shops are showing more care in picking their work and the element of time in delivery required along with character of the work is being given first consideration. Plain material prices are unchanged at 3.25c to 3.50c, Pittsburgh, or 3.419c to 3.669c, New York.

CONTRACTS AWARDED.

Masonic Temple, Cleveland, 1,800 tons to American Bridge Co.

American National Bank building, bank and office building, San Francisco, 918 tons, to Central Iron Works, San Francisco.

Herring Motor Co., service garage at Des Moines, Ia., 323 tons, Des Moines Bridge & Iron Co.

Great Northern Railroad Co., six oil tanks, 168 tons.

Union Railway Equipment Co., structural steel for use at Michigan City, Ind., 102 tons.

Western Pacific Railroad Co., three riveted spans, 200 feet each, and one 60-foot through girder span at Sacto, Cal., 900 tons, to McClintic-Marshall Construction Co.

CONTRACTS PENDING.

Bridge across Little Walnut Creek, Madison township, to cost $40,000; 200 tons; bids being received by John Scott, clerk of Franklin county, Columbus, O.

South Gee street bridge, Richmond, Ind., to cost $185,000; 500 tons.

New plant for the Kelly Springfield Tire Co., Cumberland, Md., 6,000 to 8,000 tons, bids entered but no award yet announced.

Bridge for the Philadelphia & Reading railroad, 500 tons, bids being taken.

Subway work, Philadelphia, 8,000 tons, steel work not formally awarded but 4,300 tons expected to go to an independent shop and 3,700 tons to the American Bridge Co.

Railroad terminal, Jacksonville, Fla., 2,500 to 3,000 tons, bids being taken.

Two crane runways for the Norfolk navy yard, 7,500 tons, McClintic-Marshall Co. low bidder.

Hanger, Pensacola, Fla., 500 tons, for the government, Virginia Bridge & Iron Co., low bidder.

Bridge work for the Chesapeake & Ohio railroad, 400 tons, bids being taken.

Addition to the Hotel Woodward, Broadway and Fifty-fifth street, New York City, 2,000 to 3,000 tons, bids again being taken.

Tin Plate Demand Heavy

Pittsburgh, Feb. 13.—Demand for tin plate is extremely heavy. Consumers in all sections of the country have been unable to obtain material on account of the abnormal traffic situation. The salmon industry of Alaska may be affected by deferred deliveries, since packers necessarily have to ship material from Pacific coast points some time before the opening of the packing season. Tin plate is commanding as high as $8.25 per base box, although scarcely any material is being sold, on account of the inability of manufacturers to meet specifications for shipment before July 1. Books for delivery after that date likely will not be opened until May 1, or later. Recent international developments have caused some apprehension about the price of pig tin for future delivery.

Strip Steel Advanced

Pittsburgh, Feb. 13.—Fairly heavy tonnages of cold rolled strip steel have been sold recently at 7.50c, base, or $10 a ton above the prevailing minimum price of this product. Manufacturers have not opened books for second quarter delivery, although they have enough tonnage on hand to maintain present operating schedules until July 1, or later. Some demand exists for shipment abroad.

The Solid Drawn Forging Co., with works at Ellwood City, Pa., is reported to have completed its contract for munition for the allies.

(*For complete prices see page* 448)

Ferro is Stiff

Consumers Fear Imports May Be Curtailed by Submarine War

New York, Feb. 13.—Ferro-manganese continues its upward price movement both for early and forward delivery. English makers, after having closed sales for several thousand tons for last half delivery at $164, seaboard, have withdrawn that price and have no open quotations. An early advance is expected. Domestic producers have little metal for sale earlier than May and those in eastern territory now are quoting from $250 to $275, furnace, for May and June; $235, furnace for July-September, and $200 to $210, furnace, for October-December delivery. Carload sales have been closed here and there at $250, furnace, or better. Last week, the home makers were asking $250 for spot or first half; $200 for third quarter and $185 for fourth quarter, all delivered east of the Mississippi river.

Buying on the old schedule of prices during the past week has been active and totaled probably 10,000 tons. English makers disposed of about half of this amount for delivery over the last half. A large middle western steel maker purchased 4,000 tons. Pending inquiry amounts to about 3,000 to 5,000 tons, chiefly for delivery by July. Foreign buyers also are in the market for some quantity including 600 tons for Japan, 500 tons for Italy and other lots.

Spiegeleisen is maintaining its recent advance. Fair sales for delivery over the first half have been made at $65 to $70, furnace, for 20 per cent. One producer disposed of 1,000 tons on this basis. There also was a sale of 1,000 tons for forward delivery at a lower price. One important maker has established his price at $75, furnace, for any delivery this year. Several inquiries aggregating about 1,000 tons are in the market for delivery through the first, second and third quarters. For delivery after July, the market is quoted at about $60 to $65, furnace, for 20 per cent.

Ferro-Manganese High

Pittsburgh, Feb. 13.—On account of the uncertainty of the international situation, the market for ferro-alloys and steelmaking metals continues irregular. Many dealers have advanced prices sharply, not wanting to figure in the market until the general situation clears. Eighty per cent ferro-manganese is being held at $250 a ton; spiegeleisen has been advanced $10, to $70, furnace, and other alloys are correspondingly higher in price. Fifty per cent ferro-silicon is being held at $150 to $175, Pittsburgh. Lower grades of bessemer ferro-silicon are commanding premium prices, when makers are in a position to meet specifications for early shipment.

Quotations Advance

Chicago, Feb. 13.—The western maker of ferro-manganese has advanced quotations sharply and prompt material now is quoted at $300 per ton, furnace. Sales have been made at $275, furnace. Second quarter delivery is being booked at $250 per ton and last half at $225, furnace. Increased scarcity exists since the submarine disturbances. Railroad embargoes are preventing delivery of domestic material. Some exchange of contracts between eastern and western makers has taken place to give immediate supply and avoid delay incident to the freight situation.

Coke Stiffens

Due to Car Shortage and Zero Weather—Prices Up

Pittsburgh, Feb. 13.—Zero weather seriously has interfered with the production and shipment of coke in western Pennsylvania. Managers of coke plants say they were unable to draw more than 20 per cent of their ovens the early part of the week, on account of the refusal of employes to work. The car supply is very short, some coke plants receiving not more than 30 per cent of the normal number of cars. Prices of furnace coke for spot shipment advanced to $10 and $11 a ton on Monday; today, some cokemakers are asking $12 a ton. It is believed, however, that prices will recede just as soon as the temperature rises. Foundry coke is being held at $12 a ton at the ovens by several sellers. The market for future shipment is quiet. *The Connellsville Courier,* for the week ending Feb. 3, says production was 305,028 tons, compared with 352,401 tons the week ending Jan. 27.

Big Inquiry in Philadelphia

Philadelphia, Feb. 13.—An eastern Pennsylvania steel company, which is about to blow in a furnace long idle, is inquiring for 10,000 tons of coke monthly for the remainder of the year beginning with April. This buyer has had difficulty to get quotations. The spot market on coke has been stronger the past few days and sellers are less disposed to take orders. An eastern furnace closed for a lot of low phosphorus coke for early shipment at slightly above $10, Connellsville ovens. Some eastern users of foundry have gotten into very straightened circumstances on supplies and are willing to pay high prices for spot fuel. Sellers report that $13.50, Connellsville ovens, is obtainable. Offerings of spot coke, however, have become very scarce.

Situation is Serious

Cincinnati, Feb. 12.—The coke market is in a serious condition. The shortage of supply is increasing, for with coal selling in this and other cities around $8 a ton, operators are finding it much more profitable to sell the raw material rather than turn it into coke. Prices for spot coke range all the way from $12 to $15 a ton, depending upon conditions surrounding each sale. Railroads are unable to ship a sufficient supply to meet the needs of consumers. No quotations are out on furnace coke for any delivery over 1917. Foundry coke for 1917, or for a year beginning next July 1, is held at $8.50 to $10, ovens.

Firm at St. Louis

St. Louis, Feb. 12.—Foundry coke seems to be pretty well out of the market in this district, and sellers are quoting only for spot delivery and refusing all inquiries for contract orders. Connellsville and Virginia 72-hour grades are firm at $12.50 to $13.50, ovens, for immediate delivery. By-product coke is practically all sold up in this market, although the demand continues strong. Inquiries are coming in from a wide territory, and if any quantity of by-product coke were for sale, it probably would bring as much as $13.80, St. Louis.

Coke Lively in South

Birmingham, Ala., Feb. 13.—Coke producers in the south can sell every ton they can get out. Coal mine operators are having no trouble in selling but can get cars only for a little more than three-fourths of the demand. Coke prices range between $8 and $10 for the foundry product and not less than $4 for furnace coke. The ironmaking companies in Alabama which cannot make enough coke themselves for their own needs and go on the open market are complaining of the uncertainty of the coke supply. The Sloss-Sheffield Steel & Iron Co. is making strenuous efforts to keep six of its seven furnaces going. Contracts are being offered the coke manufacturers that will extend through the greater portion of the year and in some instances through the entire year.

A Delaware charter has been issued to the Inland Steel Co. with a capital of $30,000,000, which carries out the plan of increasing the capitalization decided upon at the recent annual meeting of that company.

(*For complete prices see page* 448)

Scrap Market Apathetic

Dealers Appear to Have Over Reached Themselves—Export Movement Curtailed by Embargoes

Philadelphia, Feb. 12.—Principal buyers of old material in this district with liberal recent purchases to their credit, are taking little interest in new lots except where bargains are offered. Only small sales are developing and these are being made on a lower basis of prices. War influences have not been as effective in bringing about the weaker and duller market as have been the filled-up condition of the consumers. Buying of heavy melting steel to fill old orders for export also is at lower prices and $20.50, tidewater, is the common offer. It is more difficult to ship this export scrap to tidewater since the railroads are withholding permission until a clear route is assured.

Buying is Sluggish

New York, Feb. 13.—Except in the higher grade materials, such as low phosphorus, special heavy melting steel, shafting, etc., where there is some demand at good prices, consumptive buying of old material remains sluggish. Small lots still figure generally. The mills usually will add to their purchases only where bargains are obtainable. There is a fair amount of cast business with the foundries. Some buying of old steel rails for export in few hundred-ton lots is being done. Outstanding heavy melting steel orders with Italy also is causing some buying. There are reports of heavier rejections in this traffic. Prices in the standard grades of scrap are easy without great weakness.

Old Materials Quiet

Pittsburgh, Feb. 13.—The market for iron and steel scrap is quiet, but prices are holding their own satisfactorily. Dealers, on account of the uncertainty of the future, are not attempting to sell material in the open market. Melters generally have enough material under contract to meet their requriements for 30 days or longer. Railroad embargoes have restricted the territory in which scrap dealers may offer material, and this accounts for the rather wide range in price at which some grades of scrap have been sold recently. Heavy melting steel is hovering around $22 to $23 a ton. Other grades show no important change in position.

Lower in Buffalo

Buffalo, Feb. 13.—Old material dealers in the Buffalo district are being held down to a minimum volume of business by the seriousness of the railroad situation. Inability to get shipments of scrap through the embargoes to points of delivery has acted like a damper on the trade. In order to dispose of lots of scrap standing on tracks it is reported that concessions have been made on heavy melting steel and several other grades. The price of heavy melting steel has sagged to $24 to $25; the price of No. 1 railroad wrought scrap to $28 to $29, and machine shop turnings have gone back to $10.50 to $11. On some tied-up lots of heavy melting steel slightly lower prices have obtained.

Cleveland Market Tame

Cleveland, Feb. 13.—The market for old iron and steel in this territory has stiffened slightly, and is steady, but is devoid of any outstanding features. There is no important trading between dealers and consumers; practically the only dealing of any consequence is among the dealers themselves, most of whom have been short and are covering. Heavy melting steel is quoted at $22 to $22.50; hydraulic pressed sheets, $18 to $18.50; railroad car wheels, $19 to $19.50; machine shop turnings, $9 to $9.10. Other lines remain about as they have been for several weeks. The freight situation is worse than it ever has been, and would be unendurable if there was any trading in volume.

Buyers Hold Market

Cincinnati, Feb. 12.—The iron and steel scrap market has failed to rally as rapidly as was expected, and although dealers have been hoping for an advance in prices for the last three weeks, no changes have been realized. Today all quotations are unchanged but firm. The market at present is in the hands of buyers. Dealers are of the opinion that a large number of melters will be forced to come into the market soon, which will result in good buying movement. No. 1 machinery cast is quoted from $15.50 to $16 a net ton, No. 1 busheling from $14 to $14.50 a net ton, and heavy melting scrap from $19 to $20 a gross ton, all Cincinnati basis.

Chicago Scrap Reserves Low

CHICAGO, Feb. 13.—Conditions in the iron and steel scrap market in Chicago remain unsettled and without material change. Large mills are not buying except occasional bargains offered by brokers and are using from their reserve stock instead of taking on further large tonnages. Prices are tending somewhat lower, although the decline of a few weeks ago has been checked. For the most part, quotations remain almost stationary.

Many observers believe that early spring will see the renewal of buying and that prices will rebound to some degree. It is pointed out that accumulations of country scrap have been largely drawn upon and will not offer opportunity for dealers to obtain large quantities of material which were available a year or more ago. Another factor is the shortage of railroad scrap, which is not being offered in as large tonnage as usual. Return of warm weather may expedite gathering this material and possibly add to the total available.

Railroad lists now current offer a little more scrap than has been the case recently. The Santa Fe railroad offers 28,000 tons, the Mobile & Ohio railroad 1,000 tons, the Union Pacific railroad 1,350 tons, the Wabash railroad 9,000 tons, and George W. Jennings 1,800 tons.

Market at Standstill

St. Louis, Feb. 12.—There was some activity between dealers last week in the St. Louis scrap market, but virtually no demand from any of the large consumers. The developments in the war situation have brought the market almost to a standstill. Consumers have used liberally of their reserve stocks, and as they are melting large tonnages of scrap, the concensus of opinion is that there shortly will be a buying movement. Some grades of scrap have receded slightly, but the market as a whole remains firm. The only railroad offerings before the market this week include a list from the Southern amounting to 500 tons, and a Big Four list covering 4,200 tons, of which 750 tons is No. 1 railroad wrought and 750 tons long length steel rails.

(*For complete prices see page* 448)

Nuts, Bolts and Rivets

Pittsburgh, Feb. 13.—Demand for nuts, bolts and rivets is heavy. Ship building interests are playing an important part in the market, and are willing to pay premium prices for rather early shipment. It is not unlikely that all three products will be put up in price at an early date.

Thomas Fawcus, president of the Fawcus Machine Co., Pittsburgh, manufacturer of gears and pinions, is enjoying a vacation at Past Christain, Miss.

Stockholders Meet

Youngstown Sheet & Tube to Pay Extra Cash Dividends

Youngstown, O., Feb. 14.—Directors of the Youngstown Sheet & Tube Co. at a meeting Tuesday declared an extra dividend of $3 a share on the common stock in addition to the regular $2 on that issue and the regular 1¾ per cent on preferred. This is the first extra dividend the company has declared during the present abnormal period. The proposal to declare a 100 per cent stock dividend was unanimously rejected by stockholders, the directors having decided in favor of increased cash dividends.

President James A. Campbell gave out figures following the annual meeting, showing the results of 1916 operations. Gross business amounted to $56,919,268, or about double the gross of 1915. Net profits were $16,741,502, out of which was expended about $15,000,000 for new construction, purchase of the Andrews & Hitchcock Iron Co., payment of coal land notes, interest and dividends, and retirement of about $1,500,000 bonds. The surplus as of Jan. 1, 1917, was between $21,000,000 and $22,000,000. The total disbursement on payroll last year was $11,079,087, which was about 50 per cent greater than the previous year.

Amasa Stone Mather, Cleveland, succeeds H. G. Dalton on the board of directors, although Mr. Dalton remains first vice president; Charles H. Booth, executive chairman of the United Engineering & Foundry Co., was elected to the board to succeed H. H. Stambaugh, of the Brier Hill Steel Co. Other directors were elected as follows: John L. Severance, Robert Bentley, George E. Day, J. A. Campbell, Richard H. Garlick, C. D. Hine, J. G. Butler Jr., and E. L. Ford.

Officers were elected as follows: President, James A. Campbell; first vice president, H. G. Dalton; vice presidents, C. S. Robinson, W. E. Manning, Richard Garlick, and L. J. Campbell; secretary, W. E. Manning; treasurer, Richard Garlick; assistant secretary and assistant treasurer, W. J. Morris; auditor, J. J. Brant; advisory committee, H. G. Dalton, E. L. Ford and C. D. Hine. Dudley Kennedy, who has been engaged in welfare work for the B. F. Goodrich Co., Akron, was named assistant to the president, succeeding L. J. Campbell, who is promoted to a vice presidency.

Lehigh Coke Sold

Late official announcement has been made, following earlier developments, that the Bethlehem Steel Co. has acquired the by-product coke works of the Lehigh Coke Co. at Didier, near South Bethlehem, Pa., control of which previously had been held by the Deutscher Bank of Berlin. The Bethlehem Steel Co. has been receiving the coke output of the works under a 20-year contract. Active management of the works has been taken over by the new owners and operations for the present, at least, will be continued under the name of the Lehigh Coke Co. In the reorganization of the company, E. G. Grace, president of the Bethlehem Steel Co., has been elected chairman; W. F. Roberts, president; C. A. Buck, vice president; B. H. Jones, secretary and treasurer, and F. A. Shick, comptroller.

Injunction Asked

By Bethlehem Stockholder to Prevent Increase in Capital

New York, Feb. 13.—Injunction proceedings against the proposed plan of the Bethlehem Steel Corporation to increase its capital stock from $30,000,000 to $75,000,000, have been instituted in the New Jersey court of chancery by the General Investment Co., a Maine corporation and the owner of 100 shares of common stock. A meeting of the stockholders of the Bethlehem Steel Corporation had been called at Newark, N. J., Feb. 14, to consider the proposed increase but this action now is restrained pending argument on the injunction petition which is to be given at Newark, Feb. 17. The complainant in the court action attacks the increase on the ground that the authorization of common stock without voting power is illegal and that the issuance of new stock is intended to keep control for the present stockholders. A financial statement of the company attached to the petition shows that of the orders on hand Jan. 1, amounting to $193,500,000, $117,500,000 represented domestic business. The export orders amounted to $17,500,000 in steel bars and $58,000,000 in guns and munitions.

Warehouse Prices

Philadelphia, Feb. 13.—Jobbers in this district have put into effect another pronounced advance in their prices and now are quoting plates at 5.25c; shapes at 4.10c and steel bars at 3.75c to 4c, all delivered in Philadelphia territory.

Government Not in Market

For Coal Tar Crudes for High Explosives—No Speculation in Toluol—Large Benzol Inquiries

New York, Feb. 13.—The government has not as yet entered the market as a buyer of coal tar crudes for high explosives and sellers are not anticipating that it will immediately. While it is known it is placing and considering hurried orders for munitions and munition materials, the purchase of enlarged needs in explosives largely would not come until toward the last of these preparations. Furthermore it is realized, apparently, by the federal authorities that the country's tremendous increased production in the essential coal-tar derivities will enable them to satisfy their requirements with the utmost dispatch whenever they are ready to do so. Producers stand prepared to supply every requirement of the government in the quickest possible time whenever the latter makes known what its wants will be.

The German crisis has had no appreciable effect on the market for leading coke works by-products. There has been no evidence of speculation by middlemen in toluol where it would be expected to appear first, since this is the most direct product of these plants for war purposes. The toluol market is quiet on new buying though a number of inquiries are current. Prices are unchanged. In benzol, there is an active demand largely for non-military purposes and some further contracts were closed the past week. One large domestic inquiry calling for several hundred thousand gallons is current as anticipated. A recent export inquiry for 200,000 gallons monthly for this year has not materialized into business. It is estimated that considerably over two thirds of the year's supply in benzol is sold. Prices remain at 55 to 60 cents per gallon for either spot or contract. Large offerings of phenol, especially for early delivery, are in the market and prices have softened. Leading sellers hold for 50 cents per pound but this is being shaded elsewhere and the real market is from 48 to 49 cents. Weakness continues in solvent naphtha with prices openly named at 25 to 30 cents per gallon but these can be shaded on desirable business. The rise in early sulphate of ammonia is more pronounced as the shortage of supply is more acute and the demand keeps up. For February-March shipment $4.25 to $4.30, tidewater, per 100 pounds, now is quoted.

(*For complete prices see page* 448)

British Markets Irregular

Brisk Buying of Pig Iron at Maximum Prices—War's Influence Seen on All Sides—Sheets Are Dull

Bureau of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Feb. 1.

The English pig iron market is passing through a period of brisk buying in all its branches. Pig iron prices are now generally firm at maximum standards. The total shipments for January amount to about 20,000 tons. At Cleveland, sellers could take contracts almost without limit, but most of them are not booking anything beyond the end of this month. Good deliveries are being made, but the quantities are not all that the consumers desire. The small stock of iron at Cleveland remains practically stationary.

Cleveland Trade is Dull

Neutrals are in the market for iron but licenses are not granted freely by the allotments committee. In the Midlands there is a big demand for foundry iron which the furnaces find difficult to meet. The call for high grade castings for war purposes seems to be increasing. There is a great demand for basic material and the wide use of chilled rolls has created an enormous consumption of cold blast iron. A new feature of the trade is a growing demand for Midland iron. This doubtless is due to the practical abolition of Cleveland as a national export center. Welsh furnaces are working at maximum capacity to meet the abnormal demand. A large consumption of hematite for home uses and for England's allies continues to be a characteristic of the market.

Government Buying is Heavy

Recent government orders for iron and steel show no diminution from the buying scale maintained during the past 12 months. If indications are true, this buying is increasing in volume. Some Black country makers of strips, angles, etc., have had to decline orders for thousands of tons. It is interesting to note that firms which find it necessary to refuse this business also find it necessary to protest against the withdrawal of their men for the armies. Obviously, the government cannot have both the men and the products of their labor. A somewhat reassuring notice, however, has been issued by the executive committee of the Steel Smelters' Association to the effect that though the iron and steel trades have been included in the general de-badging order, there is no need for apprehension because the authorities appreciate the importance of exercising discretion in dealing with the labor situation. The withdrawal of men is carried on, of course, simultaneously with the provision of substitutes, but the iron and steel trades are rather more difficult to furnish with substitutes than are some of the other industries. Plant managers are determined not to accept inefficient in place of capable workmen. The prospect of extensive enlistments from ranks of the iron and steel industry is, therefore, not very promising or alarming.

Price Irregularities on Bars

Recent quotations for American billets have not yielded any new business. The quoted figure is $69.60, at which British users of billets cannot profitably buy. It is estimated that at this figure, $104.80 would have to be charged for the finished bars. Some mill owners lately have taken on business purely as rolling transactions, putting on the buyer the responsibility of supplying the billets. A few wire rods continue to be bought at about $135, but the quantity of this material seems to be decreasing. It is likely that formal application will be made soon to the minister of munitions for an alteration of the maxima for bars.

More Electric Furnaces

The large new plant which the National Malleable Castings Co. will erect at Cleveland, will include in its melting equipment, two 15-ton heroult electric furnaces for the production of malleable iron. Licenses for these furnaces have been issued by the United States Steel Corporation. The National Malleable Castings Co. now has five 6-ton heroult electric furnaces in operation, two of which are at Sharon, Pa., and three at the Grant works, Chicago. A license also has been issued by the United States Steel Corporation for one 6-ton furnace to the Union Electric Steel Co., of Carnegie, Pa., and will be used for alloy steels. This will be the second heroult furnace in the plant of this company. Hamilton & Hansell, 17 Battery place, recently sold a 1,000-pound, 125-kilowatt Rennerfelt electric furnace to be installed at the United States mint, Philadelphia, to be used for the melting of copper and nickel. The Parsons Co., Newton, Ia., has decided to install a 1½-ton Rennerfelt furnace, 400 kilowatts, to take the place of a ¾-ton unit previously used. The large furnace is expected to be in operation in March.

(*For complete prices see page* 448)

To Open Coal Mines

Youngstown Company Lays Plans to Thwart Fuel Shortage

Youngstown, Feb. 13.—The Youngstown Sheet & Tube Co. is laying plans to make itself independent of the open coal market, and the fuel shortage problem which it faces in common with other manufacturers. It expects to sink two shafts in its southwestern Pennsylvania coal properties in the near future and produce about 6,000 tons a day.

The corporation owns 7,100 acres, estimated to be underlaid with 70,000,000 tons of steam and coking coal. The properties, acquired at an aggregate cost of about $4,000,000, have both rail and river shipping facilities up through the Monongahela valley.

About 5,000 tons of coal are consumed daily by the company and it will need full 1,000 tons more daily to provide for extension of its by-product coking facilties necessary for the two Hubbard stacks.

Unfilled Orders Decrease

New York, Feb. 10.—Unfilled orders on the books of the United States Steel Corporation as of Jan. 31, amounted to 11,474,054 tons. This figure shows a decrease of 73,232 tons from Dec. 31, the first decline in unfilled tonnage since September. On Jan. 31, 1916, unfilled orders on books amounted to 7,922,767 tons, the gain in 12 months of orders over shipments amounting to 1,551,287 tons. Comparison of orders on book at the close of last month with previous months follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Jan. 31, 1917	11,474,054	73,232—	6.35—
Dec. 31, 1916	11,547,286	488,744+	4.43+
Nov. 30, 1916	11,058,542	1,043,282+	10.41+
Oct. 31, 1916	10,015,260	492,676+	5.18+
Sep. 30, 1916	9,522,584	137,133—	1.42—
Aug. 31, 1916	9,660,357	66,765+	.69+
July 31, 1916	9,593,592	46,866—	0.48—
June 30, 1916	9,640,458	297,340—	3.09—
May 31, 1916	9,937,798	108,247+	1.11+
Apr. 30, 1916	9,829,551	498,550+	5.34+
Mar. 31, 1916	9,331,001	762,035+	8.89+
Feb. 29, 1916	8,568,767	646,199+	8.16+
Jan. 31, 1916	7,922,767	119,547+	1.53+
Dec. 31, 1915	7,803,220	616,731+	8.58+
Nov. 30, 1915	7,189,489	1,024,037+	16.63+
Oct. 31, 1915	6,165,453	847,834+	14.06+
Sep. 30, 1915	5,317,618	409,163+	8.13+
Aug. 31, 1915	4,908,455	20,085—	0.04—
July 31, 1915	4,928,640	250,344+	5.35+
June 30, 1915	4,678,196	413,598+	9.69+
May 31, 1915	4,264,598	102,354+	2.46+
Apr. 30, 1915	4,162,244	93,505—	2.21—
Mar. 31, 1915	4,255,749	89,622—	2.06—
Feb. 28, 1915	4,345,371	96,800+	2.28+
Jan. 31, 1915	4,248,571	411,928+	10.74+

Motor Plow Company

Organizes in Cleveland—Will Manufacture White Tractor

Cleveland is to have a new type of manufacturing concern. The Cleveland Motor Plow Co. recently purchased 50 acres between the Nickel Plate railroad and Euclid avenue on the outskirts of the city which is rapidly being improved with manufacturing buildings. The first unit of the factory has already been completed and contracts are pending for the second.

The company is manufacturing a tractor, invented by Rollin H. White, president of the company, designed to be used around lumber yards and for farm hauling and plowing in the fields, as well as stationary work. The complete outfit consists of a 24-horsepower engine, with 16-horsepower at the draw-bar; 50 inches wide, 52 inches high and 8 feet long. It can be turned around in its own length, and weighs 3,000 pounds. It is claimed that this tractor will pull two 14-inch plows, 8 inches deep, in the worst kind of plowing, and three of them in easy plowing. The tractor is all metal and retails at $785.

Wm. O. Henderer Dies

Wm. O. Henderer, aged 52 years, president of the Osborn Engineering Co., Cleveland, died at Miami, Fla., Feb. 8, after a brief illness from peritonitis. Mr. Henderer was one of the prominent civil engineers of Cleveland. A graduate of the Rennslaer Polytechnic Institute, Troy, N. Y., he was successively employed in civil engineering work by the Pennsylvania Lines, the Detroit Bridge Co., and the Berlin Bridge Co., until he joined F. C. Osborn in Cleveland, in 1893.

On the organization of the Osborn Engineering Co. in 1900, Mr. Henderer was made vice president. In 1910, he was made president and held that office at his death. He was a member of the American Society of Civil Engineers, and a past president of the Cleveland Engineering Society.

Machinery Needed

The Torbensen Axle Co., 1115 East 152d street, Cleveland, manufacturers of internal gear drive truck axles, will erect a machine shop addition to its plant with an area of about 30,000 square feet. The contract for the building has been let but orders for the machinery, shafting, etc., have not been placed.

Contracts have been awarded by the Pacific Coast Steel Co. for the construction of an additional 40-ton open-hearth furnace at its plant at Seattle. This addition will increase the steel works at Seattle to three 40-ton furnaces. The company also operates a plant at San Francisco consisting of two 4-ton and three 30-ton open-hearth furnaces.

Busiest Winter

In the History of the Mesabi—Many Shovels Are at Work

The present winter is the busiest in the history of the Mesabi range. The months are being well occupied in preparing for the coming season which it is thought will be even bigger than 1916. It may be estimated that on the whole range 60 shovels are working day and night and several properties are being developed which will increase the shipping capacity of the range. This activity extends throughout the whole iron mining section. In the western part especially, there is a great deal of work in progress. In the Canisteo district of the Oliver Iron Mining Co. there are 10 shovels at work and at Nashwauk at least that many have been at work at the various properties. No less than five new mines will be opened up in the Nashwauk district during the coming season and two concentrating plants will also be built. Butler Brothers are developing the Patrick and will in the not far distant future strip the Ann near to it. A. B. Coates, of Virginia, Minn., and his associates are opening the Troy mine which they will strip. A new pit is being developed at Keewatin.

At Hibbing there is also a great deal of activity. The company is operating several shovels in that district and there has been stripping at the Mahoning, the Warren and Webb properties near to the village. In the Chisholm district, three shovels are at work. Eveleth and Virginia are especially busy. Virginia is witnessing the opening of the Missabe Mountain mine, a property which was stripped to a limited extent some years ago. Four shovels are now operating. The Oliver company has purchased three of the large 300-ton Bucyrus shovels. These are of 87-foot boom and one will be placed at Virginia, one at Eveleth and one at Hibbing.

Such activities mean a great deal of prosperity for the towns dependent on the mining industry.

New Sheet Mills

The Whitaker-Glessner Co., Wheeling, W. Va., advises that it shortly will begin the erection of an 8-stand sheet mill plant, with auxiliary equipment, at Beech Bottom, W. Va., 12 miles north of Wheeling on the Ohio river, where a site recently was purchased. Contracts for the new plant have been awarded and ground will be broken at an early date. The Foundation Co., New York City, has the contract for the foundation work; the McClintic-Marshall Co., Pittsburgh, will erect the buildings; the Wheeling Mold & Foundry Co., Wheeling, will furnish the mills; the Westinghouse Electric & Mfg. Co., will install the electric equipment; the George J. Hagan Co., Pittsburgh, will build the heating and annealing furnaces; the Falk Co., Milwaukee, Wis., will furnish mill drives, and the Pawling & Harnischfeger Co., Milwaukee, will install electric cranes. The mills will be electrically driven.

Large Amount

Paid to United States Steel Corporation Employes in Pensions

Employes of the United States Steel Corporation and subsidiary companies who are on the pension list received in 1916 the sum of $711,130 according to the sixth annual report of the United States Steel and Carnegie Pension Fund. This disbursement compares with $659,389 in 1915, $511,967 in 1914, $422,815 in 1913, $358,780 in 1912 and $281,457 in 1911 or a grand total of $2,945,541. An increase of 11 cases was made to the active list during the past year and the number continued beyond Dec. 31, 1916, was 3,013, compared with 3,002 active as of January 1, 1916. The number of new cases in 1916 was 275 and of those discontinued in that period 264. The average age of the beneficiaries from 1911 to 1916 inclusive was 65.33 years, of service 29.93 years and the average monthly pension was $21.05. Of the year's disbursements, $170,981 was paid by the Carnegie Steel Co., $150,520 by the American Steel & Wire Co., $72,956 by the American Sheet & Tin Plate Co., $72,528 by the H. C. Frick Coke Co., $64,361 by the National Tube Co., $52,958 by the American Bridge Co., $48,399 by the Illinois Steel Co. and the remainder by the other subsidiaries.

New Scrap Firm

C. T. Luntz and H. F. Stocker, both of whom are well known in the iron and steel scrap trade in the central west, have entered that business under the name of the Luntz-Stocker Iron Co., which recently was incorporated in Pennsylvania. The company has offices at 611 Park building, Pittsburgh. Mr. Luntz, who is the son of S. Luntz, of the Canton Iron & Metal Co., formerly was identified with the Luntz Iron & Steel Co., Canton, O., in the iron trade.

Sharon Steel Hoop

Acquires Control of Youngstown Iron & Steel Co.

Youngstown, O., Feb. 13.—Acquisition of the control of the Youngstown Iron & Steel Co., Youngstown, O., by the Sharon Steel Hoop Co., Sharon, Pa., was effected today, it is reported unofficially, and formal announcement is expected to be made tomorrow or Thursday.

Terms of agreement are said to have given all stockholders the right to sell at $200 a share. The Sharon interests are reported to have acquired a preponderating block at that price, after first having obtained options expiring Feb. 15.

The Youngstown Iron & Steel Co. was formed and incorporated in 1894, with a capital of $12,000. Its capital stock is: Authorized, $2,200,000 common and $800,000 7 per cent cumulative preferred (increased from $1,200,000, all of one class, in 1914); outstanding, $1,200,000 common and $600,000 preferred; shares $100. The preferred stock is subject to call at 105 on any dividend date and is convertible into common at par, of which an equal amount is reserved against the conversion. The company manufactures sheet iron, sheet steel, steel plates, fireproofing material and pressed steel specialties. The resignation of John O. Pew as president and general manager, to take effect March 1, is expected to take effect Thursday.

The Sharon Steel Hoop Co. was incorporated in 1900. Its capital stock, authorized and outstanding, is $2,500,000; shares, $50. Its annual output is 120,000 tons of steel billets and sheet bars, and 95,000 tons of finish rolled products, including steel hoops, bands and cotton ties. Officers are S. P. Ker, president; G. W. Short, vice president; and J. R. Evans, secretary and treasurer.

More Ship Orders

New York, Feb. 14. (By wire.)—Foreign governments are active in the ship building market and continue to place orders for new boats and to purchase contracts for vessels now partly completed. British interests have closed orders for six vessels and as many more are pending, the placing of which depends whether material can be obtained. Three boats recently closed went to the Union Iron Works Co., San Francisco. The French government also has purchased several vessels under construction in this country.

Export plate and shape business is heavy. New sales amounting to 60,000 tons have been made. Steel production continues to be cut by gas and coal shortage. Some of the Corporation's finishing mills are idle and a number of blast furnaces are still banked.

New Rail Orders

New York, Feb. 14. (By wire.)—New rail orders covering miscellaneous tonnages have been announced. The northern Pacific has placed 5,000 tons and the Kansas City terminal system 1,500 tons with the Illinois Steel Co. Scattering rail orders amount to probably 20,000 tons.

Will Rebuild

Pittsburgh, Feb. 14. (By wire.)—The Union Switch & Signal Co., at a meeting of officers today, will adopt plans for rebuilding the machine and assembling shops damaged by fire Saturday. The new plant, including equipment, will cost approximately $3,000,000.

Dr. F. S. Whitman, president of the Belvidere Screw & Machine Co., Belvidere, Ill., is spending the winter at Palm Beach, Fla.

A Few Car Orders

New York, Feb. 14. (By wire.)—Inability to get steel which has been greatly aggravated by traffic congestion is holding down new buying of cars. A large French order is still before the market and some bids have been taken on it. The Louisville & Nashville wants 1,000 underframes and the Birmingham Southern 200 hopper cars.

Safety Congress

The National Safety Congress has chosen New York City as the place for holding the sixth annual safety congress. The week of Sept. 10 will be occupied by the sessions. The main offices of the association have been removed to 804 Continental and Commercial National Bank building, Chicago, to obtain larger space for its enlarged activities.

The structural mill shop of the Toledo Bridge & Crane Co. has been running over 100 per cent capacity for the last six months, according to C. A. Peckham, manager of that concern. During January the sales force of the company sold 150 per cent of the capacity of the mill shop for domestic purposes entirely and booked the crane department with business for the next four months.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, Feb. 13.—The belief that it is only a question of time before the United States will enter the war has been responsible for a more bouyant tone in the metal markets during the week closing today. Prices on copper, spelter, lead and antimony have continued to advance, while tin prices have eased off. Demand for copper now is brisk, both for first and second half positions and, in view of the sold up condition of the market on this metal, prices have ascended rapidly. Electrolytic now is quoted as follows, on the basis of actual sales: February, 35.75c to 36.25c, cash; March, 35c to 35.50c; April, 34.50c; May, 33.50c to 34c; June, 33c to 33.50c; third quarter, 30c to 30.50c. Lake copper now is quoted about as follows: February, 35.50c to 35.75c; March, 35c. Casting copper is quoted at about 32c to 32.50c, cash, for February shipment.

Prices in the outside market on lead have been far in advance of those quoted by the American Smelting & Refining Co. The latter interest on Feb. 9 advanced its New York asking price from 8c to 8.50c. At that time the outside market was quoted at 8.87½c to 9c, St. Louis, for February shipment, and 8.75c for March shipment, and these figures still represent the prevailing level. Inquiry for lead is active and the metal is scarce for shipment over the next two months. Lead is especially scarce in the east due to the railroad congestion in the middle west. Spot lead in New York is commanding 9.25c, New York, or higher.

The spelter market has been rather quiet but the undertone is firm due, to some extent, to expectations of government buying in case we go to war. Prime western is quoted as follows: Prompt shipment, 10.75c, St. Louis; February, 10.50c; March, 10.25c; second quarter, 9.75c to 10c. Due to scarcity of spelter in the east, resulting from the railroad congestion, prime western which is close to New York has been sold at 11.75c, New York. Brass special commands a premium of about 1c over prime western prices.

The aluminum market has eased off due to larger second hand offerings. No. 1 virgin, in carload lots for prompt shipment, is quoted at 55c to 58c; No. 1 remelted at 50c to 53c, and No. 12 remelted at 37c to 39c.

The antimony market was in an excited condition last week due to a big demand for the metal by the Bethlehem Steel Co., the Steel Co. of Canada and several other concerns. For spot antimony, which continues exceedingly scarce, 32c was paid. Today offerings are freer and spot is quoted at 28c to 30c, duty paid. Futures also are higher. February shipment from the Orient is quoted at 18c, in bond, while March and April shipments are quoted at 17c.

(For complete prices see page 448)

Making Manganese Steel Castings

The Difficulties Attendant Upon the Production of Alloy Castings Are Not Always Appreciated—The Author of this Article Points Out a Few of the Pitfalls Usually Encountered

BY W. S. McKEE

ALTHOUGH the steel foundry industry has made tremendous strides in the past decade, the difficulties surrounding the manufacture of steel castings are scarcely less embarrassing at present than they were 10 years ago. As fast as the problems standing in the pathway of progress are solved and removed, new perplexities arise owing to the enlargement of the field of operations. The growth of the industry has led to specialization and

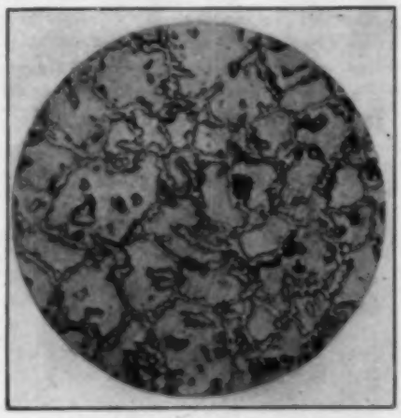


FIG. 1 — MICROSTRUCTURE OF CAST MANGANESE STEEL UNTREATED, MAGNIFIED 100 DIAMETERS

at present there are several large steel foundries in the United States and abroad that concentrate their efforts on the production of high manganese castings. On account of its peculiar properties, including remarkable resistance to abrasive action, manganese steel is used for a great variety of industrial purposes and the shops manufacturing this material in the United States now have a combined capacity of approximately 70,000 tons per year.

Strange to say, however, the difficulties surrounding the manufacture of manganese steel castings do not seem to be as fully appreciated as those connected with the production of ordinary carbon-steel castings, possibly because they have not been as widely discussed. As a matter of fact, the manganese steel foundryman finds himself confronted with all the problems of the ordinary steel foundryman, plus a host of special complications arising from the peculiar physical and chemical characteristics of the material with which he is working. In order to achieve success it is necessary to have special experience all along the line, particularly with reference to melting and mixing the metals and heat-treating the castings. It is for the purpose of pointing out and discussing some of the peculiar problems of the manganese steel foundryman that this article has been written.

Manganese steel was developed originally in England, largely through the efforts of Sir Robert Hadfield. It has been manufactured on a commercial basis for nearly 26 years. The first manganese steel castings made in the United States were turned out in 1892. Originally it was considered impossible to make manganese castings successfully weighing over a few hundred pounds, but at the present time large rolling mill pinions, crusher heads and similar castings weighing up to 30,000 pounds each are being produced regularly and it does not appear that the limit of weight has been reached by a considerable margin.

A Great Variety of Uses

Manganese steel castings are used for a great variety of purposes, including parts for asphalt presses, ball mills, brick and tile machinery, cement kilns, Chilean mills, clay mills, coal breaking machinery, coal mining machinery, concrete mixers, copper converters, traveling cranes, crushers, dredges, gears, grab buckets, steam shovels, lifting magnets, rolling mill machinery, stamp mills, etc. Manganese steel also is employed for the manufacture of safes, railway frogs and crossings, foundry tumbling barrels, etc.

As manufactured at present, manganese steel is similar in analysis to ordinary converter metal except that it is high in carbon and unusually high in manganese. In ordinary commercial castings the proportions of the latter metal range from 11 to 13½ per cent. This combination of elements gives the finished castings certain distinctive metallographic and physical qualities, which will be detailed later in this article. From one standpoint, manganese steel is similar to malleable iron in that the casting as it comes from the sand is almost glass hard and very brittle. It must be made ductile by an annealing or heat-treating process. The heat treatment is a very essential part of the process, and must be properly manipulated to insure satisfactory results.

The necessity for heat treatment limits the thickness of section which it is possible to cast successfully with manganese steel. Originally the castings were made with comparatively thin sections, but researches carried on during

FIG. 2—MICROSTRUCTURE OF CAST MANGANESE STEEL PROPERLY HEATED, MAGNIFIED 100 DIAMETERS

the past few years by prominent manufacturers have resulted in a gradual increase in the thickness of section that it is possible to treat successfully, until at present castings with walls up to 5½ inches in thickness are handled satisfactorily. Heavy castings are cored out to a minimum thickness of 5½ inches. This not only serves to eliminate the internal stresses which invariably are set up in a very thick casting, but also reduces the weight and inertia of the piece, an important consideration if the casting is a moving part in a machine. At the same time, the maximum annealing thickness of 5½ inches is sufficient to permit the use of manganese steel for the heaviest classes of machinery. It is evident from the foregoing, that although manganese steel is made in a converter and cast in sand molds, the process is by no means a simple one. Unusual experience and ability are required if successful results are to be obtained.

The early papers of Sir Robert Had-

A paper presented at the September, 1916, meeting of the American Foundrymen's Association, Cleveland. The author of this paper, is vice president of the American Manganese Steel Co., Chicago.

field mentioned tensile tests of specimens of manganese steel showing an ultimate strength of approximately 100,000 pounds per square inch with elongations as high as 40 per cent. In some few instances an ultimate strength of 150,000 pounds per square inch is mentioned by Mr. Hadfield. That the physical characteristics of manganese steel are superior to many high grade steels is indicated by the following

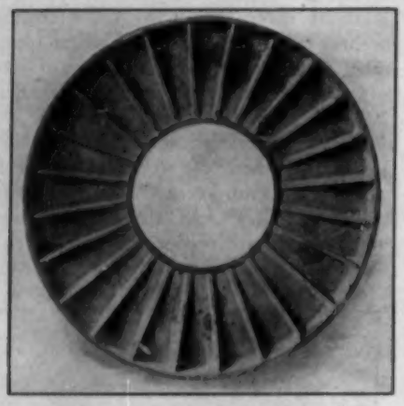


FIG. 3—COIL SHIELD FOR LIFTING MAGNET

figures averaged from a series of 19 tests of manganese steel made by Robert W. Hunt & Co., Chicago. The figures are as follows: Elastic limit, 53,396 pounds per square inch; tensile strength, 108,460 pounds per square inch; elongation in 2 inches, 33.71 per cent; reduction of area, 38.56 per cent.

Manganese steel does not owe its wear resisting qualities to its hardness. When subjected to the Brinell test, it

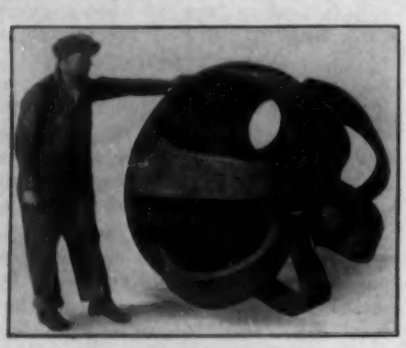


FIG. 4—LARGE MANGANESE STEEL CUTTER HEAD

shows an average hardness number of about 200. The extreme outer fibre of the treated steel shows a slightly lower hardness number than at a depth of about 1/8-inch. From the latter point the hardness remains constant to the core of the casting. The lowering of the hardness at the surface is due to the oxidation of the carbon which forms on the surface during the heat treatment. The toughness of the material is due to its great molecular cohesion which causes the particles to flow rather than to tear off. When tested with a scleroscope, manganese steel shows a hardness of from 40 to 50. The specific heat ranges from 0.145 at ordinary temperature to about 0.20 at 1,200 degrees Cent. Between ordinary atmospheric temperatures and 600 degrees Cent., the heat conductivity appears to be about one-third that of low carbon steel. The specific gravity of manganese steel ingots is nearly the same as the result obtained by the usual method of determining specific gravity with a chemical balance, using a small specimen of cast steel. The rolled steel is slightly heavier than the cast material.

Peculiar Electrical Properties

The electrical resistance of manganese steel is approximately 3.4 times the resistance of ordinary bessemer steel. At temperatures between 100 and 600 degrees Cent. the electrical resistance is said to remain practically constant. Manganese steel is non-magnetic and advantage is taken of this property in the use of this material for shields or bottom plates for lifting magnets, such as are extensively employed in foundries. The shrinkage of manganese steel is excessive, amounting to 5/16-inch per foot as against 3/16-inch to ¼-inch in ordinary steel foundry practice. The high shrinkage creates a number of foundry problems which will be discussed in some detail later. Cast manganese steel has a chemical composition as shown in the following table:

CHEMICAL ANALYSIS OF MANGANESE STEEL.

	Per cent
Carbon	1.25
Silicon	0.30
Manganese	12.50
Sulphur, less than	0.02
Phosphorus, about	0.08

The distinctive characteristics of manganese steel are clearly delineated by the microscope. It is well known that manganese is present in all ordinary steel, but the metal does not become austenitic until about 6 per cent manganese and 0.80 per cent carbon are introduced. Commercial manganese steel generally contains from 11 to 13½ per cent manganese and from 1.00 to 1.30 per cent carbon.

Metallographic Explanation of Characteristics

In the cast state the metal is composed principally of austenite and free cementite, austenite being a solution of iron, manganese and carbide of iron and manganese, while free cementite is composed of the carbide of iron and manganese which remain undissolved. Free cementite is very hard and brittle and therefore manganese steel is also very brittle in the cast condition. However, upon receiving a proper heat treatment all of the free cementite is dissolved forming austenite which is known to be very ductile and to present a high resistance to wear. We thus have a metallographic explanation of the chief characteristics of manganese steel. In order to obtain the austenitic structure it is necessary that the steel be given a correct treatment. Microscopic examination reveals the fact that if the steel is heated to a proper temperature and quenched in water, it is composed entirely of austenite. By the aid of the microscope, therefore, the proper structure can be determined and together with physical tests and chemical analysis most excellent results are obtained.

The accompanying microphotographs, Fig. 1 and Fig. 2, show the structures of manganese steel as cast and after treatment, magnified 100 diameters. Fig. 1 shows the structure of manganese steel in the cast condition. Fig. 2 shows the same steel heated to a temperature of 1,800 degrees Fahr. and quenched in water. It will be noted that since the heat treatment all of the free cementite has disappeared leaving a purely austenitic structure. If the steel is again heated to over 700 de-

FIG. 5—EARLY DESIGN OF DREDGE BUCKET SHOWING SHARP CORNERS IN BACK EYE

grees Fahr. the pure austenitic structure is destroyed, seriously injuring the quality of the metal. It, therefore, is imperative that manganese steel should not be heated to a temperature exceeding 700 degrees Fahr. after leaving the foundry where it was manufactured.

Owing to shrinkage difficulties and to the problems connected with annealing, it is necessary, in order to achieve success in the manufacture of manganese steel castings, to start with the design of the parts. A few simple changes in design may spell the difference between success and failure in the foundry. It is necessary for the designer, however, to have a thorough knowledge of the peculiarities of the metal. The importance of correct design is very clearly indicated by the dredge buckets shown in Figs. 5 and 6. The original type of bucket is shown in Fig. 5 and the improved design in Fig. 6. In Fig. 5 is will be noted that there are two square corners in the back eye. In this design the bushing,

with which the eye is fitted, bears on the shoulders created by the two sharp corners previously mentioned. Although these corners were provided with a small fillet it was found extremely difficult to insure perfectly sound metal at this point. As a result, the bucket was apt to fail at one of the points of greatest stress. In the improved design shown in Fig. 6 it will be noted that the two square corners have been entirely eliminated resulting in a much more satisfactory job from a foundryman's standpoint. Fig. 6 not only shows the new form of the back eye but also illustrates the bushing with which the eye is fitted. Generally speaking it is more necessary to avoid an abrupt change in section and sharp corners when making manganese steel than when turning out ordinary low carbon steel castings.

It is necessary that the pattern be provided with the proper shrinkage allowances and for this reason many manganese steel foundrymen prefer to make their own patterns from original drawings supplied by their customers. When patterns are furnished they frequently have to be rebuilt in order to obtain satisfactory results. The allowances for shrinkage are not confined simply to the dimensions of the pattern, but also include the distribution of the metal in the casting. At times it is necessary to add metal to a casting temporarily to withstand shrinkage strains; such additions of metal are removed in the machine shop by grinding before the casting is shipped. In handling work of this character, unusual skill is necessary in order to properly allow for shrinkage stresses. While a majority of the patterns used in manganese steel foundries are made of wood, it has been found advantageous to use metal where great durability is required, as in ordinary practice. A complete manganese steel casting plant, therefore, should include a properly equipped pattern shop provided with band saws, circular saws, woodworking lathes, and boring and mortising machines, together with other equipment for the rapid and economical production of patterns.

FIG. 6—PRESENT DESIGN OF DREDGE BUCKET WITH CORNERS IN BACK EYE ELIMINATED

The molding floor of a typical large manganese steel foundry is shown in Fig. 9. It will be observed that the crane equipment is extensive including heavy electric traveling cranes which span the entire floor, supplemented by wall cranes. In making molds it has been found that ordinary molding sand and clay binders are unsatisfactory on account of the cutting action of the molten metal. Sands with a high percentage of silica are used and most of the molds are oven dried. Special facing mixtures are required owing to the crushing effect of the shrinking manganese steel. An open facing which will yield readily is necessary, but at the same time sufficient skin hardness to prevent the mold from being washed away is required. Similar difficulties are encountered in providing proper core sand mixtures. These mixtures must be free venting; they must have sufficient strength to stand up properly under the destructive action of the molten metal and at the same time the core must yield readily when the casting commences to shrink. The larger manufacturers of manganese steel have conducted extensive experiments which have enabled them to determine the proper mixtures for facings and core sand and to develop standard formulas.

How the Metal is Melted

For melting the metal standard side blow converters have been found satisfactory. At the Chicago Heights plant of the American Manganese Steel Co. two cupolas are provided for the primary melting of the metal and four 3-ton converters are installed. The cupolas are situated on a mezzanine floor behind the converters and are so arranged that the metal may be drained directly from the cupola spouts into the converters. The ladle and crane equipment is similar to that found in the average steel foundry handling heavy work.

Manganese steel is a special converter metal to which a quantity of ferro-manganese is added in the ladle. Standard 80 per cent ferro-manganese is employed and it is necessary to provide suitable facilities for melting this material. For this purpose either crucibles or specially designed reverberatory furnaces may be employed. If the latter method is used, considerable experience is required to design the furnace properly and to operate it successfully. The reverberatory furnace, however, has certain advantages over the crucible method, inasmuch as under proper conditions the labor cost is much less. The working conditions in the furnace room also are less severe and the cost of crucibles, no small item at the present time, is eliminated.

The melted alloy is placed in the bottom of the ladle and the steel from the converter is poured in on top, enough ferro-manganese being used so that the castings will show about 12½ per cent manganese when analyzed. This is an average figure; the exact quantity of manganese varies somewhat with the nature of the work. The manganese acts as a strong scavenger, removing the gases and impurities from the metal, leaving it condensed and homogeneous. The production of slag is excessive and before the molds are poured the ladles are allowed to stand for a time in order to permit the alloy to perform its function and also to skim off the slag. The raw materials used in the production of the converter metal include low-phosphorus pig iron and selected steel scrap, similar to those used in the ordinary bessemer steel foundry. The same careful selection is necessary to insure uniformity in the finished product. The metal is handled and poured while very hot.

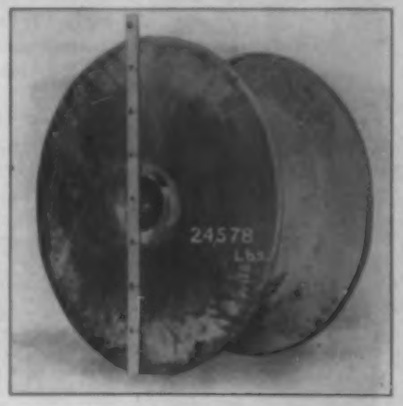


FIG. 7—MANGANESE STEEL DREDGE TUMBLER WEIGHING 24,578 POUNDS

FIG. 8 — HEAT TREATING FURNACES WITH TANKS FOR QUENCHING CASTINGS

As previously mentioned, when the castings come from the sand they are glass hard and before they are suitable for use they must be annealed. For this purpose furnaces of the proper

size in which the temperature may be readily controled are necessary, together with quenching tanks and suitable crane equipment for handling the hot castings. The annealing furnaces are of the ordinary open-flue type. Usually they are provided with cars on which the castings are placed for the heat-treating process. It is essential that as little time as possible elapse between the moment when the furnace door is opened and that when the casting is immersed in the quenching tank. It is, therefore, desirable to locate the tanks directly in front of the annealing furnaces as shown in Fig. 8.

In discussing the heat treatment of manganese steel, W. S. Potter in a paper presented before the Western Society of Engineers, at Chicago, Feb. 17, 1909, makes the following interesting statements:

"Upward of 75 years ago men in Sheffield, Eng., understood that steel containing moderate additions of manganese had certain properties which could be described as those of carbon steel, and that steels containing a higher percentage than 5 per cent or 5½ per cent were very weak and brittle.

"Some 30 years ago the Hadfields, father and son, or their associates, found, and the son advertised, the fact that castings and forgings containing the higher percentage of manganese, after heating to a high temperature and quenching with water, were very strong and tough and that the treated steel had remarkable resistance to abrasive wear. The proportion of manganese mentioned as suitable for track-work castings, in Hadfield's early patents is 11 per cent. No heat treatment was mentioned in the early papers, but later a treatment was announced and consisted in heating the casting at first slowly and then rapidly to 800 degrees, 900 degrees, or 1,000 degrees Cent., and immediately quenching in water. No theory covering the necessity of this reheating and quenching was given.

"Manganese steel of ordinary composition poured in a layer about ¼-inch to ½-inch thick in a chill mold will, when cold, bend double, and has all the usual toughness of reheated and quenched manganese steel. Castings from the same ladle of steel poured in sand molds have a toughness approximating the toughness of the reheated and quenched metal in inverse proportion to the thickness of the sand cast section. For example, a sand-cast section ½-inch thick will usually bend from 45 degrees to 90 degrees before it breaks by cold bending. A section 2 inches thick usually breaks in cold bending before it is deflected as much as 20 degrees. The thinner section is whiter and has smaller crystals than the heavy sand-cast section, and the chill-cast section is still whiter and has still smaller crystals than the thin sand-cast section. If the three specimens are heated to 1,000 degrees Cent. and quenched in water they will exhibit in each case a very remarkable and practically equal degree of toughness. In all these cases the steel has practically the same hardness. The chill-cast specimen, before reheating, is the hardest; the sand-cast specimens are the softest. If the specimens are now heated to 700 degrees Cent., or even a little lower temperature, held for, say one-half hour at this temperature, and cooled slowly to ordinary temperature and broken, they are surprisingly weak, and as a rule, bend but slightly before breaking. The crystals are very large and it is obvious that no strong cementing materials are present to bond the crystals. A section 3 inches thick cooled slowly from the heat of casting, and put under a drop weight will break about as readily as an equal thickness of a fair quality of gray iron and will frequently show crystals with a mirror surface as large as 1¼ x 1 inch. For the most part such a section so treated and broken will show crystals about ¼-inch to ⅜-inch on a side. A specimen heated to above 700 degrees Cent. and cooled slowly to below 600 degrees Cent., is very weak. If this specimen is reheated to 700 degrees Cent., and quenched in water only, a slight increase in toughness is noted. The crystals are still apparently as large as ever. The bond between the crystals is almost as weak as before, and yet from the other tests it is clear that the steel crystalizes or re-crystalizes considerably below 700 degrees Cent.

FIG. 9—GENERAL VIEW OF MOLDING FLOOR OF TYPICAL MANGANESE STEEL FOUNDRY—NOTE EXTENSIVE CRANE EQUIPMENT

Analysis by Color Tests

"Comparing this steel with a carbon steel it is obvious that the cementing materials are not taken into solution at as low a heat in the manganese steel as in the carbon steel. In the carbon steel, the size of crystals, strength, toughness, etc., may be redetermined any number of times by reheating to 700 degrees Cent. and cooling, and as is well known, the physical properties are governed by the rate of cooling. The manganese steel after being put in a weak condition due to slow cooling from 700 degrees or above is only put in a condition of maximum toughness by reheating to a much higher temperature and then cooling rapidly enough to prevent either mechanical or chemical separation. A comparison of color carbon tests with determinations of total carbon by combustion, shows that the slow-cooled steel has a much smaller amount of carbon in the condition which permits of the determination of carbon by color than the manganese steel which has been rapidly cooled. The highest color result is obtained from the thin chill-cast section, the next highest from a specimen heated for a short time only and quenched in water. The lowest carbon result, by color test, is found in the specimen which has been heated to a high temperature, maintained at this temperature for some time and cooled very slowly. The chill-cast specimen showing by total carbon determination 110 points carbon, by color test may show 105 to 108 points. The specimen annealed at a high heat will give color results ranging from 0.60 to 0.95 per cent, depending upon the time to which the specimen was exposed to the highest

temperature, the rate of cooling, and the percentages of manganese and silicon.

"As might be anticipated from the general knowledge pertaining to the art of "black heart" malleable iron manufacture, the percentage of silicon plays a very important part in the decomposition of carbides of iron and manganese in manganese steel. Manganese steel is readily burned when heated, and this burning is more difficult to avoid as the temperature increases. For this reason it is usual to heat for quenching only to a point sufficiently high to give the characteristic toughness in the quenched metal. If castings or other finished shapes are reheated for toughening to a high temperature they are apt to be very generally affected with deep cracks. To avoid burning and cracking the reheating is generally stopped at about 1,000 degrees Cent."

In operating the annealing ovens or furnaces it is necessary to heat the castings up slowly so as not to create expansion strains which will cause cracks. If the castings are heated rapidly the outside, of course, heats faster than the core, resulting in internal stresses of a serious nature. After the proper annealing temperature is reached, from 1,600 to 2,200 degres Fahr., the castings must be given a soaking heat for several hours in order to bring the molecules into a state of equilibrium. The time required for this operation varies from 4 to 24 hours depending on the size and character of the casting. As previously stated, the thickness of the metal which can be successfully annealed has gradually been increased until now castings with walls 5½ inches thick are handled without any great difficulty. It is advisable to have the water in the quenching tanks as cold as possible in order to cool the castings quickly, before there is any time for internal structural changes. The men drawing the castings from the annealing furnaces must be protected from the heat with special clothing and helmets. Respirators also are desirable owing to the noxious gases emitted from the furnace when the door is opened.

Castings not Easily Cleaned

The proper cleaning of manganese steel castings presents many problems in itself. Very little sand adheres after the casting comes from the quenching bath. The metal is so tough, however, that practically all of the trimming operations must be conducted by grinding. Extensive portable, electrically-driven grinding equipment is necessary for this purpose. A general view of a modern manganese steel foundry grinding and cleaning room is shown in Fig. 10. It will be noticed that a heavy

FIG. 10—GRINDING ROOM IN A LARGE MANGANESE STEEL FOUNDRY

investment is required in order to properly equip this portion of the plant.

Most manufacturers of manganese steel castings have found it advisable to establish extensive machine shops in connection with their plants. If the castings are to be finished in any way, special equipment is necessary. Ordinary machining methods are unsuccessful and grinding must be resorted to. Holes, more than ¼-inch in diameter, are cored out of the castings and ground to size with special wheels. When it is necessary to drill smaller holes or to cut threads soft steel or wrought iron inserts are set in the molds at the desired points like chaplets and the metal is cast around them. Incidentally this adds to the difficulties of the foundryman. Sometimes bushings are set in the hubs of gear wheels when it is desired to machine them by ordinary methods. Liberal allowances of metal are made for grinding in order to minimize the danger of spoiling the work in the machine shop.

It is necessary for the machine shop foreman to exercise his judgment continually; coarse wheels and heavy cuts are used so that the metal is removed rapidly, although by no means as easily as would be the case were it possible to employ ordinary cutting tools.

Some mention already has been made of the purposes for which manganese steel is used. In the foundry, manga-

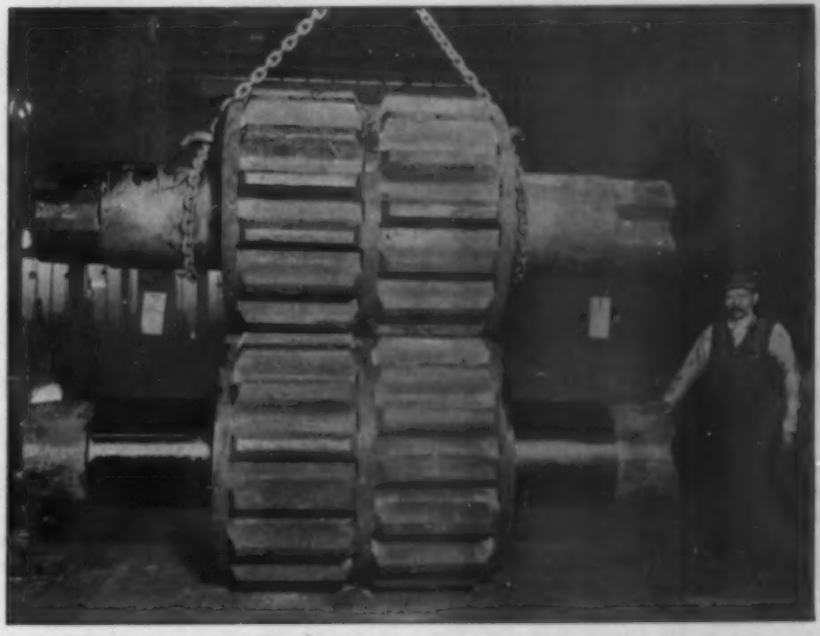


FIG. 11—HEAVY 52-INCH MANGANESE STEEL ROLLING MILL PINIONS

nese steel is used for the linings for tumbling mills as well as for gears, crane wheels, elevator buckets, grab buckets, lifting magnet shields, etc. This material is particularly desirable for lining tumbling mills owing to its extreme resistance to abrasion. Where loads are heavy, manganese steel is extensively employed for gears and for the past three or four years it has been possible to produce manganese steel spur gears with the teeth ground theoretically correct. Ground gears now can be provided up to 44 inches pitch diameter with a 10-inch width of face. Many ordinary steel gears are cut with a range cutter which does not leave the rolling contact theoretically correct, whereas in grinding manganese steel gears a trimming arrangement is placed on the grinder for the purpose of dressing the emery wheel to the proper contour of the tooth face, so that when the mating gears are meshed each tooth is provided with a perfect contour on which to roll. After two years continuous service, the wear on a set of heavy, high-speed manganese nest gears recently was measured. These gears had a 10-inch face and when new, the tooth measurement at the pitch line was 0.684-inch. At the conclusion of the two years' service, the tooth measured 0.601-inch. These gears are still in service after having more than earned their original cost and barring accidents they should be good for many years to come. The total wear was less than 0.1-inch.

Advantages of Manganese Steel

Manganese steel has advantages for crane wheels where uniform diameters must be maintained on the drives to insure straight alignment in travel. A microscopic examination of a manganese steel wheel under load will show a flat spot instead of a line contact as in the case of hard metal wheels. Manganese steel under these conditions is springy and recoils as the load is released. About 30,000 pounds always has been considered a safe working load on chilled iron wheels for this purpose. Manganese steel crane wheels, however, are in successful use with rolling loads of 90,000 pounds per wheel.

Manganese steel also is extensively employed in the manufacture of rolling mill machinery. It has been found particularly suitable for the pinions on heavy roughing and blooming mills. A set of typical rolling mill pinions made of cast manganese steel are shown in Fig. 11. These pinions are cored out to a maximum thickness of 5½ inches, which decreases their inertia. Many other machine parts around steel mills are now being made of manganese steel including pipe drawing balls, chafing plates, sprockets, cams, draw chains, unloader chains, conveyor chains and buckets, screens, crusher castings, etc. It may be easily appreciated that the successful production of manganese steel castings involves a wide experience in machine design and construction as well as in foundry practice and metallurgy.

Better Alloy Steel Due to Automobile

BY D. N. A. BLACET

IN YEARS past, the practice in steel metallurgy was to melt a charge consisting of pig iron and scrap with the addition of certain fluxes for the oxidation and removal of the impurities contained in the bath of metallic iron lying on the hearth. When the reaction between the oxidizing substances and the inherent contaminations in the bath, namely, sulphur, phosphorus, silicon and carbon, was more or less complete, the heat was tapped and the steel converted into merchantable product.

This roughly describes the prevailing method of steel manufacture antecedent to the perfection of the automobile. The introduction of the automobile, its gradual improvement and later approach to perfection required steel of purity, free from foreign and detrimental constituents, a steel which would withstand severe and continued stresses and strains of service. As the automobile, with its rapidly moving parts actuated by high-powered motors, has in a sense become standardized, so has the manufacture of steel which enters into its vitals, progressed. The sluggishness of metallurgy's early advance underwent rapid acceleration. The steel of today is different from the steel of yesterday. It represents quality.

Consistent with the selection of crude materials which furnish the fundamentals for the manufacture of steel destined for important parts of the automobile, is the care observed in the use and selection of the ferro alloys and metals added intentionally to the bath for the purpose of obtaining distinctive characteristics in the resultant steel. Not content with accepting the stated composition of the alloys as mentioned in certificates of purchase as sufficient precaution against chance of possible variation in percentage of required constituents in the finished steel, the careful manufacturer depends only upon his own laboratory for information regarding the amount of carbon or chrome or manganese or nickel the commercial alloys contain.

A thorough analysis of the alloys is imperative before incorporating the alloy in the steel. These precautions are very essential in view of the fact that high-grade alloy steels for the automobile are purchased subject to rigid specifications. If the analysis of the finished steel does not correspond to the "spread" allowed in the specifications, the steel is rejected by the purchaser. The loss thus entailed by the manufacturer is very great and not commensurate with the cost involved of being informed of the exact amount of alloys which had been added to the steel in the furnace before tapping. This precaution of analyzing the ferro-alloys profits the manufacturer in two ways: The salvage of the heat of steel and efficiency in the use of alloys, especially the more expensive alloys. This double saving is of definite interest both to the purchaser and the manufacturer especially in a time when the price of material continues to rise and in some instances is rising to those of the period of reconstruction. As a consequence, the modern methods practiced insure the production of quality steel and husbands the supply of high-priced material.

There are many safety practices in the manufacture of steel for which the automobile has been responsible, and each manufacturer has adopted individual methods for safeguarding his product, which, under ordinary circumstances, would never have been considered necessary. This includes double inspection for seams and other surface defects; also pickling certain analysis of steel billets to more plainly show the surface defects.

Today, when operations are progressing with accelerated speed, and where the rate of production is continuously forging ahead by leaps and bounds, and where the demand for tonnage becomes predominant, it is difficult for the manufacturer to resist the temptation to double or triple capacity at the sacrifice of quality. The manufacturer who subverts the natural inclination to flirt with the lure of tonnage, and adheres conscientiously to the manufacture of quality material must eventually secure recognition.

From a paper delivered by D. N. A. Blacet, metallurgist of the Central Steel Co., Massillon, O., before the Steel Treating Research Club, Detroit.

Roll Scale in Bessemer Practice

Although the Use of Roll Scale in the Converter is Not a "Cure-All," Its Influence Tends to Increase Production, Lower Operating Costs, and Improve the Quality of the Steel

BY A. PATTON AND F. N. SPELLER

ROLL scale in the bessemer process was first used about 20 years ago by the Ohio Steel Co., Youngstown, O., now the Ohio works of the Carnegie Steel Co., under the direction of Sam MacDonald, superintendent of the bessemer department at these works. Two 10-ton vessels and one blowing engine capable of blowing one heat at a time were employed.

The object of using the scale was to shorten the length of the blow, or, in other words, to increase the production with the same equipment. Various means were tried out for introducing the roll scale into the bath of molten iron. It was shoveled into the vessel before the heat was charged, so that the metal would flow over the scale; it was shoveled into the bath after the vessel was turned up; it was dumped into the empty iron ladle by the wheelbarrow-load and, at times, was dumped on top of the molten metal in the iron ladle. But the practice of introducing the scale into the iron ladle had to be abandoned on account of danger from explosions and of skulling the ladles. It was soon learned that the proper place to charge the scale was in the empty vessel, so that when the molten iron was poured into the vessel it flowed over the scale, causing a considerable reaction to take place before the heat was turned up. Eventually, cylindrical chutes similar to those now in use were installed. Into these chutes the scale is dumped and carried into the empty vessel. Before this convenient means of introducing the scale was adopted, the Ohio works had satisfactorily demonstrated that roll scale would increase production, by blowing 107 heats in one 12-hour turn with one blowing engine blowing one heat at a time; whereas, prior to the use of scale, the best record at this works was about 80 heats under the same conditions.

In using roll scale and other oxides of iron to facilitate and control the refining of pig iron in the converter, the bessemer plant has borrowed one of the most active agencies used in the open hearth process with much the same results. The effect of such additions on quality, production and cost are discussed in this article.

Experience has shown that the judicious use of roll scale in the bessemer operation will not only increase production and reduce cost, but that at the same time it will improve the general quality of the steel. Most of the data on which these conclusions are based were obtained at the bessemer plant of the National works, National Tube Co., McKeesport, Pa., with the assistance of George Hitchins, superintendent of steel works, and others of this company.

Taking up these phases of the subject in order of importance and with special reference to the manufacture of soft, weldable steel for pipe, it can be assumed that the most important element in this problem is uniformity of operation. A higher standard of uniformity, especially in those points which affect the welding quality of the steel, is demanded in the manufacture of steel skelp than for other products, and it is probably true that this is generally obtained under modern conditions. Prominent among the factors contributing to this success is the use of roll scale in the converter.

The influence of this practice on quality is primarily due to the wider latitude in silicon which is thereby given to the blast furnace operations, resulting in higher average silicon and lower sulphur. To obtain uniformly low-sulphur metal from the blast furnace, the bessemer department must be designed and operated so as to be able to use, without complaint, iron that will run from 1 to 3 per cent in silicon. This gives the blast furnace management a larger margin of safety, thus sudden changes to prevent making iron too hot or too cold for the bessemer plant are unnecessary. At the steel plant of the National works the average sulphur in the steel for 1915 was 0.038 per cent with 95 per cent under 0.050 per cent; the blast furnace iron averaged for that year 1.77 per cent silicon.

The proper use of roll scale, pig and steel scrap enables the blower to

An abstract of a paper to be presented at the New York meeting, February, 1917, of the American Institute of Mining Engineers.

Table I

Test Showing Influence of Roll Scale

Experiment run number	Analysis of mixer iron			Weight of charge in pounds					Per cent Si	Blast pressure	Time of blow, min.	Analyses of slags					
												—Converter slag—			—Ladle slag—		
	Total C	Si	Mn	Mixer iron	Pig iron	Steel	Roll scale	Total weight				SiO_2	Iron	Mn	SiO_2	Iron	Mn
No. 1.																	
Scale...	4.34	1.96	0.84	18,640	.....												
Scale...	4.21	2.20	0.81	19,180	.....	3,160	.....	21,800	1.80	23	19.0	65.27	15.30	8.11	53.12	15.70	14.00
No. 2.						2,130	1,210	22,520	1.90	23	12.5	61.80	17.50	7.84	50.10	16.20	13.44
Scale...	3.98	1.60	0.76	19,000	3,000												
Scale...	4.06	1.63	0.77	19,000	2,000	.....	.....	22,000	1.63	25	18.6	63.60	16.20	8.11	48.06	15.60	12.84
No. 3.						.....	1,000	22,000	1.56	25	10.0	62.26	17.70	8.64	48.64	16.50	12.97
Scale...	3.92	1.62	0.70	19,100	3,500												
Scale...	4.00	1.96	0.75	19,200	2,500	.....	.....	22,600	1.62	25	18.9	65.34	16.50	8.24	50.48	13.00	11.59
No. 4.						.....	1,400	23,100	1.87	25	11.3	63.40	16.50	8.15	52.04	15.90	12.94
Scale...	4.20	1.79	0.64	19,020	2,540												
Scale...	4.00	1.77	0.68	19,080	1,550	.....	.....	21,560	1.80	25	15.0	63.50	14.50	6.82	47.40	18.20	18.21
Averages.	4.08	1.82	0.74	.....	.....	.....	1,000	21,630	1.69	25	10.2	60.50	18.70	8.01	47.00	16.10	16.95
						.....	.....	.....	1.73	..	....	.....	.....	....	.....	.....	.....

NOTE.—The average weight of all converter slags produced for this month was 2,010 lb. per heat. The ladle slag averaged 417 pounds per heat and was quite constant.

Table II

Theoretical and Actual Losses in 1915

Loss in Direct Iron	Per cent	Loss in Cupola Metal	Per cent
Carbon	4.25	Carbon	4.00
Silicon	1.76	Silicon	1.56
Manganese	0.70	Manganese	0.60
		Cupola loss	1.26
Total	6.71		7.42

Loss of Other Materials Added

	Per cent		Per cent
Loss in steel scrap, Mn	0.35	Per cent vessel and ladle slag	7.50
Loss in ferro-manganese	30.00	Iron in slag	23.40
Loss in roll scale	....		

Material charged.	Per cent of charge	Per cent loss	Per cent of total loss
Direct metal	77.15	6.71	5.17
Cupola metal	11.49	7.42	0.85
Steel scrap used in vessels	3.57	0.35	0.01
Ferro-manganese and ferro-silicon	0.59	30.00	0.18
Roll scale, metallic	2.80	....	(?)
Pig iron used for scrapping vessel	4.40	6.71	0.30
Plus iron in slag, 7.5 per cent × 23.40 per cent	....	....	1.75
			8.26
Less credit received for iron in slag			0.09
Theoretical loss			8.17
Actual loss			8.45

turn down his heats nearer to the same point in carbon by giving a sharper contrast on the final changes in the flame. This makes the loss in manganese and in residual manganese in the steel more constant. It also enables all heats to be blown more nearly in the same time and to the same temperature, which, of course, is favorable to uniformity in heating and rolling and makes all dependent operations more systematic.

The introduction of roll scale provides oxide of iron which would otherwise have to be formed by burning about 1.5 per cent of the metallic charge. Somewhat higher silicon must, therefore be present when roll scale is used to make up the thermal deficiency.

In designing a bessemer plant, about all the engineer can do with regard to production is to make the vessels sufficiently large to blow the size of heat desired, with a bottom having sufficient blast area to blow the heat in a given time. He would probably use in his calculations a pig iron with 1.00 to 1.25 per cent silicon. If the blast area was figured sufficiently large to blow iron containing 2.00 to 2.50 per cent silicon in the same length of time, the operator would be in trouble when required to blow iron carrying in the neighborhood of 1.00 per cent silicon. The vessels would slop badly, increasing the loss, and the quality of the steel would deteriorate. A vessel properly designed, with a bottom having sufficient blast area, using 20 to 25 pounds per square inch blast pressure and designed to blow a heat of 1.00 per cent silicon iron with pig scrap in 10 minutes, will blow a heat of 1.25 per cent silicon iron in the same time if steel scrap is used. When the silicon rises above 1.25 per cent, roll scale and pig scrap can be used, increasing the scale as the silicon rises and so continuing to blow heats in approximately 10 minutes. When the iron runs above 2.00 per cent silicon, it may be advisable to use steel scrap and roll scale, although the proportions required cannot be laid down according to rule, but must be varied by the operator, depending on mill conditions.

By this procedure, heats can be blown in 10 minutes which would othwise require 18 minutes; thus the full capacity of the plant can be maintained regardless of variations in the pig iron.

Steel scrap is not used with roll scale as a rule unless it is desirable to blow the heats more quickly, and this usually becomes necessary only when the silicon in iron rises above 2.50 per cent.

This plant has increased production at least 20 per cent by the use of roll scale in this way. For example, the mill records for the month of March, 1916, show that there were 64,055 tons of ingots produced in 7,132 heats, and the charges were as follows: Direct metal, 78.4 per cent averaging 1.72 per cent silicon; cupola metal, 10.0 per cent containing 1.22 per cent silicon; scrap, 11.0 per cent consisting of steel 2 per cent, pig iron 5.5 per cent, and roll scale 3.5 per cent.

During the month, delays for various reasons caused a loss of 64 hours and 48 minutes, so that the actual operating time was 583 hours, 12 minutes, or 14.75 minutes per heat per vessel was the average time required to charge, blow and pour out each heat.

The sulphur in the steel for the above month averaged 0.039 per cent with 94 per cent under 0.05 per cent.

Table III

Converter and Cupola Losses

Loss in Direct Iron	Per cent	Loss in Cupola Iron	Per cent
Carbon	4.11	Carbon	3.90
Silicon	1.89	Silicon	1.66
Manganese	0.70	Manganese	0.60
		Cupola loss	1.24
	6.70		7.40

Known Losses of Other Materials

	Per cent
Steel scrap	0.35
Ferro-manganese	30.00
Roll scale	(?)
Per cent vessel and ladle slag	9.10
Total iron in slag	33.00*

*This is about 10 per cent higher than the yearly average for 1915 due to stiffer vessel slag and greater amount of shot included.

Material charged.	Per cent of charge	Per cent loss	Per cent of total charge loss
Direct metal	76.58	6.70	5.13
Cupola metal	10.76	7.40	0.80
Steel scrap in vessels	4.10	0.35	0.01
Ferro-manganese and ferro-silicon	0.57	30.00	0.17
Roll scale	3.93	....	(?)
Pig iron for scrapping in vessel	3.89	6.70	0.26
Iron in slag	9.10	33.00	3.00
			9.37
Less credit received for iron in slag returned to blast furnaces for month			0.15
Theoretical loss			9.12
Actual loss			9.03

The time required to charge the heat, pour into ladle, dump slag, fix stopper, etc., is at least 4 minutes, which would make an average blowing time of less than 11 minutes per heat. This month is fairly representative of current practice at this plant, as the average silicon in metal from the blast furnaces for 1915 and for the first nine months of 1916 was 1.77 per cent for each period. It is doubtful if this plant could make 80 per cent of this amount of steel without the use of roll scale. The practice of using roll scale was started at this plant in November, 1906, prior to which the silicon in blast furnace metal averaged 1.36 per cent for 1905 and 1.37 per cent for 1906. The period from June 15 to July 15, 1916, shows an average of 1.90 per cent silicon in direct furnace metal, the lowest cast being 1.03 per cent and the highest 2.98 per cent. In Table I under column heading "Time of blow" are some data obtained on heats blown at the same time and under the same conditions which illustrate the influence of roll scale on time of blow.

In order to determine the influence of roll scale by itself, several experiments were made in November, 1916, by running five heats with and without scale at the same time in this plant, all other conditions being maintained constant as nearly as possible. The results of these tests are given in Table I. The difference in time of blow is the most striking feature. This is entirely accounted for in the shortening of the silicon blow. For example the following records from the last series in Table I are noteworthy:

	With roll scale		
Heat number	3	4	5
To first carbon flame, min.	2½	3¼	3
Finish of blow, min.	10	11	10½
	Without roll scale		
Heat number	3	4	5
To first carbon flame, min.	7	7¼	7¾
Finish of blow, min.	14¼	15	15

To determine whether a larger percentages of iron was carried away in the slags under certain conditions, samples of mixer metal and slag were taken for analysis throughout the month of November, 1916, with results shown in Table IV. This indicates that these slags are fairly uniform. At least the combined iron in the slags does not vary with the silicon in the charge, as would be expected if the variable amount of roll scale added had any material influence on the slag. As the converter slags were as a rule observed to have the same physical consistency as well as practically the same analyses under this practice, it may be assumed that the free iron or shot carried away in the converter slag is also proportional to the weight of slag produced, which varies with the silicon in the charge.

During the month of November, 1916, when the experiments referred to in Table I were made, all the converter slag that was shipped from the mill was weighed and the loss in the lining and bottoms of the converters was weighed or estimated. With these data and the analyses of the slags and the charge throughout the month, the loss in metal in the slag has been computed as follows:

Weight of slag calculated from silica contents per charge of 22,400 pounds.

	SiO_2, pounds
100 pounds from bottom × 80 per cent	80.0
50 pounds from sides × 97 per cent..	48.5
Total	128.5

1.74 per cent Si in charge = 0.0174 × 22,400 × $^{60}/_{28}$ = 835.2

Total SiO_2 in charge = 963.7

Slags carry 60 per cent SiO_2 average from analyses of samples after removing shot.
Silicates in slag = 963.7; 963.7 ÷ 0.60 = 1,606
Slag per heat, as weighed for month = Pounds 2,016 = 9 per cent of charge
Theoretical weight of slag from SiO_2 in silicates = 1,606
Shot and scrap = 410 or 20.3 per cent of slag
Combined iron in silicates = 16 per cent × 1,606 = 256 pounds = 12.7 per cent of slag
Total iron in slag = 33.0 per cent

The silicon in the charge for the group of heats included in the test heats referred to in Table I was practically the same as the average for the entire month. The actual converter and cupola loss for this month amounts to 9.05 per cent, which is somewhat above the average, due to an unusually high percentage of shot in the slag and to the fact that the average silicon for this month was comparatively high. The converter and cupola losses for this month have been analyzed as shown in Table III.

For comparison, the converter and cupola losses at this plant for 1915, which are more representative of the average practice, have been computed and are given in Table II.

There is probably a little more loss due to the greater activity of the reactions in the converter when using dirty or moist roll scale, but this is recovered for the most part and is credited to the steel works. The free iron now lost in the converter slag might also be recovered to advantage so that the necessary excess loss by this practice would consist of only a little more than the combined iron in the larger volume of slag when the charge carries a higher content of silicon. It appears from the experience cited above, that this iron would be lost in any case if the silicon in the charge is raised.

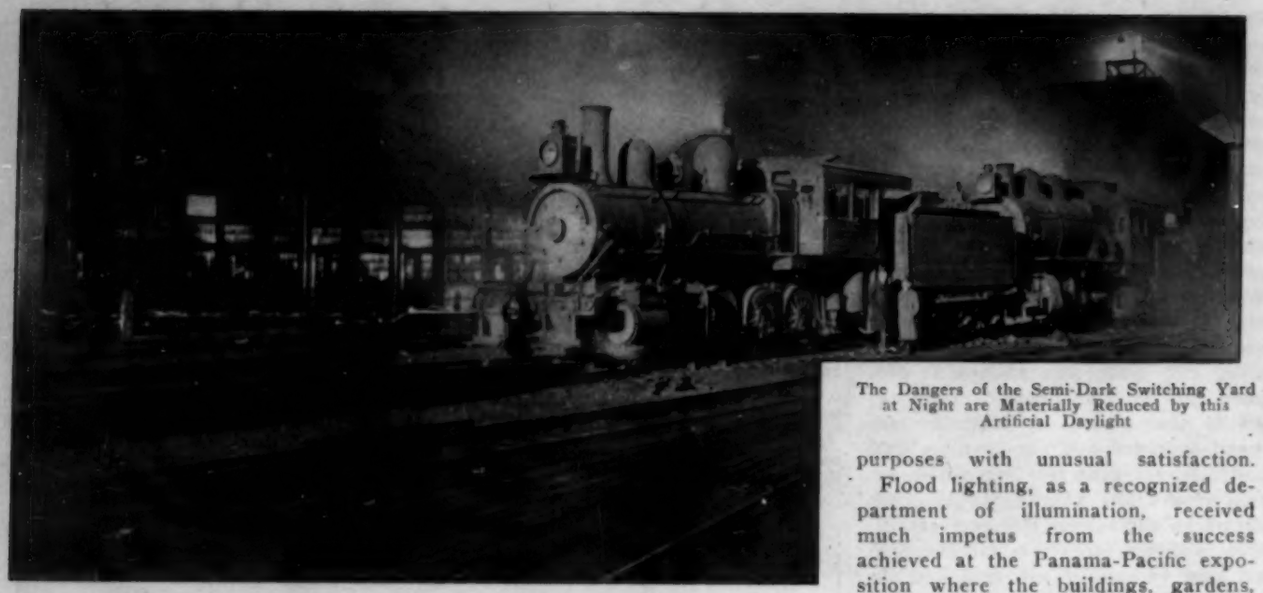
Against this loss, most of which is in consequence of the larger volume of slag produced, there must be credited a 20 per cent reduction on steam cost and a similar reduction in most of the other items of cost, together with a 10 per cent increase in scrap-melting capacity due to the use of higher-silicon iron. It is hardly necessary to produce further figures to indicate that there is a substantial saving in cost of production by this practice. It may be said that it costs a little more to make the higher-silicon iron, but this is obviously more than offset by the advantages obtained, some of which, such as increased yield of finished product, are difficult to compute.

Table IV

Analysis of Converter Slag and Mixer Metal

Date.	Analysis of mixer iron Si	Total C	Mn	Analysis of vessel slag* Si	Fe combined	Mn
Nov. 1–2–3	1.90	....	0.75	60.70	16.40	8.21
Nov. 4–6–7	2.00	....	0.76	61.50	18.10	8.40
Nov. 8–9	1.90	....	0.77	62.70	16.40	7.75
Nov. 10	1.63	4.06	0.77	62.26	17.70	8.64
Nov. 10	1.60	3.98	0.76	63.60	16.20	8.11
Nov. 11	1.74	4.02	0.86	.....	16.70	....
Nov. 13	1.78	4.12	0.83	.....	16.70	....
Nov. 14	1.80	4.58	0.74	.....	20.20	....
Nov. 15	1.93	3.90	0.72	.....	16.50	....
Nov. 16	1.68	4.16	0.82	.....	17.10	....
Nov. 17	2.40	4.28	0.85	.....	14.80	....
Nov. 18	2.00	4.04	0.74	.....	17.30	....
Nov. 20	1.96	4.00	0.75	63.40	16.50	8.15
Nov. 20	1.62	3.92	0.70	65.34	16.50	8.24
Nov. 21	1.46	....	....	.....	16.70	....
Nov. 22	1.92	....	....	.....	15.40	....
Nov. 23	1.96	....	....	.....	16.30	....
Nov. 24	1.42	....	....	.....	18.00	....
Average	1.83	4.10	0.77	62.78	16.85	8.21

*After removing metallic shot amounting to 20 per cent of samples, the average for this month.



The Dangers of the Semi-Dark Switching Yard at Night are Materially Reduced by this Artificial Daylight

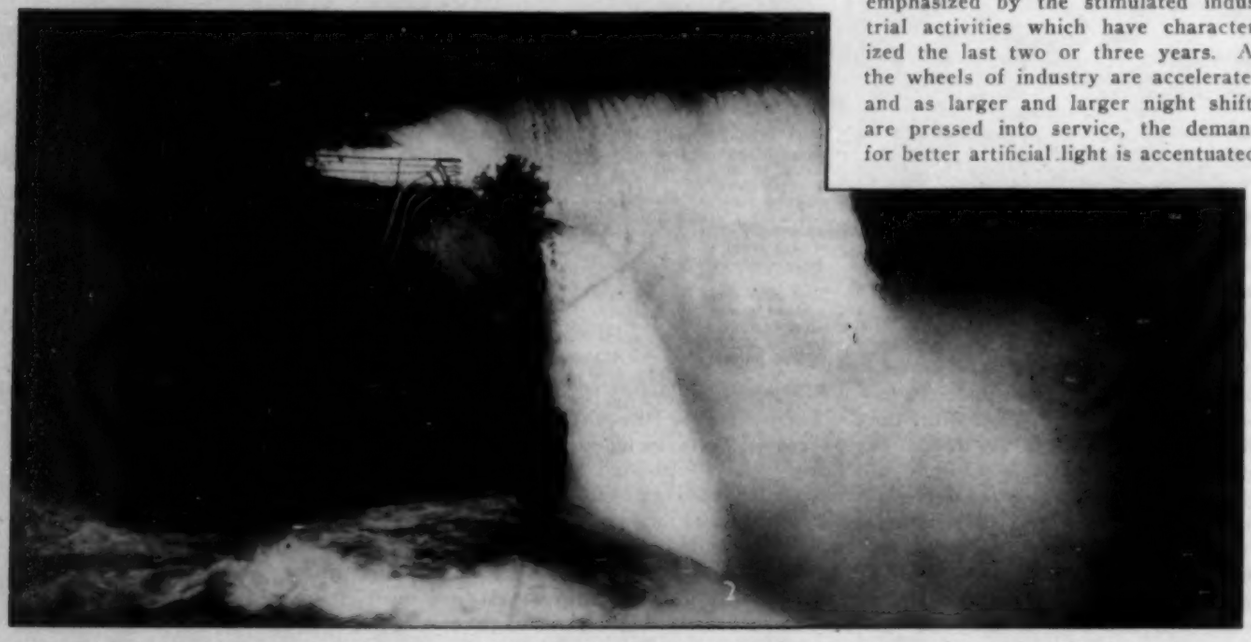
Flood Lights in Industries

WHEN the flood-lighting units that illuminate the Statue of Liberty were first energized on Dec. 2, 1916, at a word from President Wilson, the successful culmination of three years' effort and development on the part of flood-lighting experts was realized. The beautiful effect of this illumination is certainly commensurate with the importance of the statue as America's most famous monument. While the lighting of Liberty attracted international notice because of the traditions and sentiments connected with it, this installation of flood-lighting units is, of course, but one of hundreds now in operation throughout the United States. The development of suitable lamps and reflectors for this effective type of illumination has led to its adoption for many purposes. The wonderful scenic effects of flood lighting on Niagara Falls, a reproduction of which is shown at the bottom of this page, make that installation worthy of particular mention. The use of light from powerful reflectors to bathe the exterior of buildings and for installations similar to those at the Falls and Bedloe's island, has brought the desirable features of flood lighting to the attention of engineers, who have applied this type of illumination to industrial purposes with unusual satisfaction.

Flood lighting, as a recognized department of illumination, received much impetus from the success achieved at the Panama-Pacific exposition where the buildings, gardens, towers and patios were bathed in beautiful, vari-colored lights from hundreds of concealed projectors. More than 600 acres of the exposition grounds were at night actually made to resemble day. This is the effect, without the decorative frills, that is so desirable for large areas used for industrial purposes. The even, well balanced illumination produced by flood lighting makes its use particularly applicable to storage yards, switching terminals of railroads and to large, open interiors such as foundries.

Good Light Increases Production

That good lighting is an important factor in increasing production and in the promotion of safety is a recognized fact. This has been strongly emphasized by the stimulated industrial activities which have characterized the last two or three years. As the wheels of industry are accelerated and as larger and larger night shifts are pressed into service, the demand for better artificial light is accentuated.



THE MAGNIFICENT SPLENDOR OF NIAGARA FALLS IS REVEALED IN ANOTHER PHASE OF ITS BEAUTY BY FLOOD LIGHTING

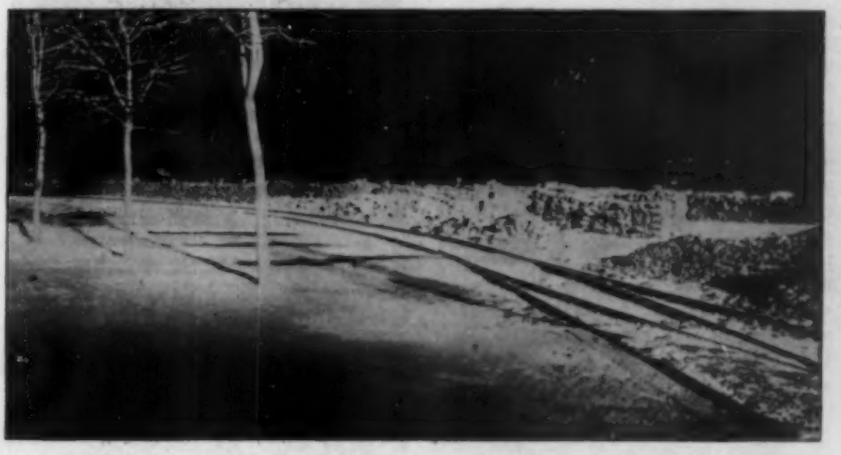
The Night Shift in this Storage Yard is Not Hampered by Shadows or Insufficient Illumination

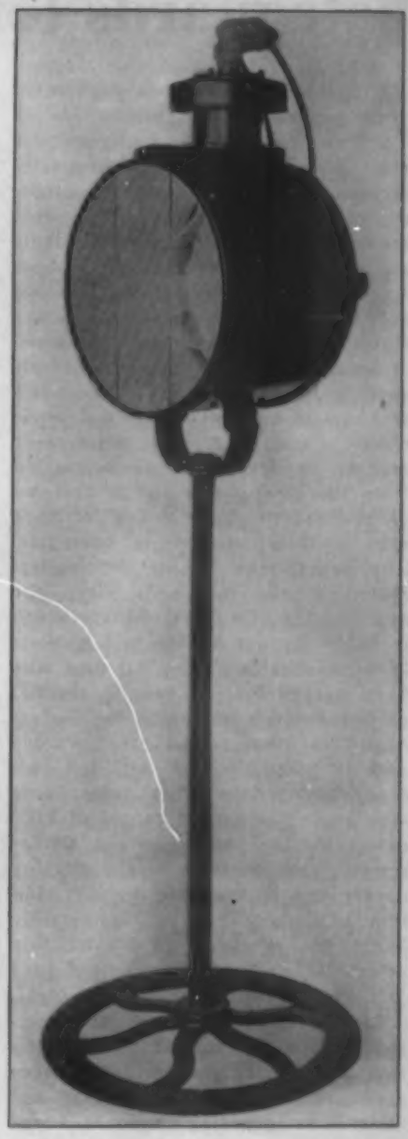
In many cases when plants were operated under less pressure than at the present time, shop work requiring only local illumination was carried on through the night with satisfaction. By increasing the operating forces working in the storage yards, the products of the night shift could be distributed during the daylight hours. Now, however, with the stress of production so high, all departments of many plants are necessarily operated for 24 hours a day. This condition, therefore, creates the necessity for satisfactory illumination in a number of places not heretofore supplied with artificial light.

Uniform Illumination Without Glare

The illustrations which accompany this article were made from unretouched photographs; they show practical installations of flood lighting equipment in switching yards, storage yards and similar places. Particular attention is called to the uniformity of the illumination, and the absence of strong shadows. It will be noticed that the light which is projected from the reflectors is distributed in a flood of light rather than in solid beam. Such distribution eliminates the disagreeable, and often dangerous, blinding effect which would be noticeable if the light were not diffused properly by the projector.

A type of flood-lighting projector which is used at Niagara Falls and which is used largely for industrial purposes is shown at the right of this page. This projector has been developed by the Western Electric Co., Chicago., and is equipped with a mirrored lens and a 1,000-watt incandescent lamp. The casing of the unit is either cast iron or steel, depending upon whether the lamp is to be used where it will be protected from rain and snow or whether it will be subjected to attacks of all kinds of weather. It is mounted on a hollow pipe standard, which is fastened to a large base of sufficient weight to give the lamp stability without bolting. A swivel joint is provided at the point where the projector is joined to the standard. This arrangement allows the lamp to be turned conveniently in all directions. Thus, if





ANOTHER STOCK YARD AVAILABLE FOR NIGHT WORK—THE PROJECTOR AT THE RIGHT IS EQUIPPED WITH A 1,000-WATT LAMP

the lamp is to be used in connection with construction work, it may be set in one place and turned to follow the course of construction as the work proceeds.

Flood lighting has assisted in solving the difficult problem of lighting foundries in a great many cases. At the time of pouring, the smoke rising from the molds tends to obscure the ordinary light sources. By placing flood lights at opposite corners of the foundry and directing their light horizontally across the molding floor above the heads of the workmen, the smoke from the molds is illuminated and in turn reflects the light to the floor below and provides a glareless, uniform light. Such illumination in foundries, especially when molten metal is being handled, tends to reduce the accident liability. The increased efficiency of the men and the attendant increases in production resulting from the use of proper illumination in industrial plants more than compensate for the original cost and the negligible upkeep expense of the lighting equipment.

Costa Rica Manganese Mine

One manganese mine is in operation in Costa Rica, according to a report of the department of commerce. The mine began shipping in May, 1916, and is now sending out about 300 tons a month, all in bags. It is making preparations to install an equipment of docks, furnaces, etc., with a capacity of 3,000 to 5,000 tons a month. This equipment probably will be completed by July 1, 1917.

Facilities for loading ocean steamers from its own docks are to be provided. Its port will be about two miles south of Braxilito, which is a little north of Morro Hermoso, on the Pacific side, considerably north of the Pacific port of Puntarenas. The plant is at Playarreal, Guanacasto, Costa Rica.

The ore is given as averaging 55 per cent metallic manganese, or for chemical purposes, 80 to 83 per cent manganese dioxide (MnO_2). Other claims have been selected, but no other company has begun operations.

The Eastern Brass & Ingot Co., Waterbury, Conn., announces the change of its name to The Eastern Brass & Ingot Corporation of New York. No change has been made in the management or interests concerned in the business.

Safeguards for Warehouses

AS AN incentive to a higher regard for safety precautions in warehouses, Jos. T. Ryerson & Son, Chicago, have inaugurated a safety first contest. The contest is adopted from the Dodge plan and records are based on the number of accidents and on the number of days lost as a result of accidents. A standard of 1,000 points is set for a perfect record. To attain this mark workmen or departments must have no accidents causing loss of full days. Penalties of a certain number of points, depending on the severity of the accident or number of days lost, are subtracted from the 1,000 points and at the end of the month the standing of each man and department is computed. The department having the highest record in the month is given the guardianship of a prize pennant which it holds for one month and exhibits in some suitable place. All men who have worked for one year in the department which maintains the highest record for that period are rewarded with 16 hours time off with full pay. Men employed in other departments who attain the perfect record of 1,000 points for the year receive a similar reward. The foreman of the winning department is rewarded by an addition of 5 per cent to his monthly bonus or 5 per cent of his monthly wages. The contest commenced June 1, 1916, and will close May 31, 1917.

In addition to this contest the Ryerson company promotes safety by means of committees which have been appointed to supervise, suggest and assist in safeguarding employes. Large instruction signs have been posted in conspicuous places; safety bulletin boards warn of accidents and inform employes how to avoid them; and frequently the men receive instructions and advice through letters enclosed in their pay envelopes. A typical warning sign is shown in the accompanying illustration.

WARNING SIGN OVER CRANE AISLE IN WAREHOUSE

In the course of a survey of southern Nigeria, deposits of lignite and coal were discovered on both sides of the river Niger near Asaba, and in the Udi-Okwoga region. The total area of these coal lands is estimated at about 1,800 square miles. The railroads of Nigeria are at present the chief consumers of coal in the country and development of the territory has been undertaken by the public works department. A railway has been built to connect the mines with Port Harcourt. The Udi coal is of the sub-bituminous kind.

A report issued by the department of mines of South Australia shows that the recent increase in the demand for tungsten minerals has attracted a number of prospectors to the Callawonga Creek district.

A Swedish expert, who has been investigating the extent of coal deposits in Iceland, has estimated the supply of this fuel to be approximately 180,000,000 tons. The coal is said to be equal to Scotch coal and it is thought that if on account of its large percentage of ash, it is found to be unsuited for steamship fuel, it will be used for power station fuel.

Harmonizing the Man and His Job

The Modern Employment Bureau Has Responsibilities Extending Far Beyond the Mere Supplying of Labor and Maintenance of Service Records— Evils of Old Systems of Employment Are Removed

BY A. H. YOUNG

THE development of the modern employment office, and the portrayal of its present functions, is not less interesting than is the growth of the much more popular and better advertised "safety first". In fact there is a similarity in the contemporaneous growth of the two movements, which, coupled with the health service, profit-sharing and other fellowship activities of present-day industrialism, must convince even a pessimist that the day of the universal brotherhood of man may ultimately be realized in America.

The employment bureau of today has responsibilities far outweighing the mere supplying of labor and maintenance of service records—when properly functioning it will provide an employe peculiarly fitted for each of varying occupations served; it will discover the worker not fitted for his task, and, having done so, will find the task fitted for the worker. Not only must job and man harmonize, but also must it be assured there will be no discord when many men are fitted to a single task. Thus, Turk, Serb, Greek, Croat, Dalmatian, Montenegran, Russian or Pole may each be found desirable as laborers in a blast furnace plant; but a wise employment agent will not try to blend them all into one gang lest the accident rate rise.

Maintenance of Service Records

The mere maintenance of an adequate service record, the most elementary function of an employment office, is in itself a peculiar service. It demands that every change of occupation, every promotion, every disciplinary act or especially meritorious service, be recorded consecutively, and be quickly available on demand.

So, too, when an employe leaves the service, the true cause of his action must be made a matter of record, and on this point alone can the competent employment agent make himself a most valuable factor in conserving desirable, experienced workers for the plant. Except for their vigilance, foremen may improperly exercise the power of discharge, or unfair conditions, easily adjusted, may cause an employe to resign.

This recital of only a few of the activities of the employment office may serve to indicate that the old order of hiring and firing is a thing of the past. Only a very few years ago it took only the beckoning crook of a boss' finger to the waiting applicant at the gate and his name forthwith appeared on the payroll. Likewise, the operation of firing or canning was fully as simple and despotic. The employment slip and the red ticket were usually mailed to the employment clerk when the timekeeper was through with them, and the dates referring thereto, together with the name and occupation of the employe, constituted the record of employment. If both employment and payroll slips reached the employment office the record was adjudged complete. When names were misspelled or slips mislaid the records naturally failed to check and it was occasionally necessary to call a misdeal and shuffle a new deck of cards, fresh drawn from the payroll. Such, with very little exaggeration, was the common status of the art 10 years ago.

The activities directed by the superintendent are numerous. First of all, the superintendent must be a keen student of human nature, quick to judge the fakir, and patient in uncovering ambition from beneath the emigrant's cloak of ignorance and awkwardness. An adequate force of interpreters and clerks, housed in an office containing a large and attractive waiting room, are necessary to properly care for the details of office routine. The superintendent should be free to spend all of his time on the larger responsibilities of the office, unfettered by clerical duties. He must not only be aware of the location of all the groups of foreign settlements in the community, but he must become personally acquainted with the individual boarding bosses, steamship agents, clergymen, and other influential agents with whom the immigrant maintains a close contact. These are his supply depots, and only by perpetual personal reconnoitering can he remain familiar with the quality and quantity of available applicants.

No less exacting is the duty of keeping closely in touch with all the foremen in the plant which he serves. A proper distribution of new employes requires the agent to know the varying character of the duties of each job in each department, and the more marked idiosyncrasies of foremen and superintendents. He must know the ability of foremen and gang leaders to speak foreign languages and be familiar with the seeming ineradicable racial antipathies and factional disturbances of the polyglot stream of humanity which passes through his department.

But the assimilation of foreigners cannot monopolize the attention of the employment manager to the neglect of skilled tradesmen and technical experts. It is true the tenure of service of individuals in these classes is practically dependent upon their proficiency in their chosen arts or sciences, and they can, unassisted, interpret rules and customs and accommodate themselves thereto, yet the head of the employment bureau must be prepared to fill all the demands made on him by plant executives, and must therefore establish his lines of communication to these centers of supply, and have a knowledge of the duties of these specialists.

Authority Vested in Superintendent

In the most progressive of our modern business organizations the manager of the employment department is given very extensive and final authority. In hiring laborers and men for occupations of relatively minor importance he passes final judgment on the applicant's fitness and hires or rejects him directly. In other cases he retains jurisdiction as to eligibility in all details, except as to skill, and passes the applicant on to the foreman or superintendent for judgment as to this latter trait. If found acceptable he is returned to the bureau and required to furnish references before being hired; these should be investigated and the replies incorporated in the files of the office.

Physical examination of employes is properly another item of employment detail. The attention which this subject received in last congress, precludes a discussion of it in this paper,

A paper read at the fifth annual safety congress of the National Safety Council at Detroit, Oct. 17-20, 1916. The author is supervisor of labor and safety, Illinois Steel Co., South Works, South Chicago, Ill.

but whatever the manner or method of examination followed, the results should be on file with service record of the employe. Usually the complete report of the physical examination is kept in the surgeon's files, and only a grade symbol used in the employment office. Thus, instead of filing the complete test report, a small card is prepared, giving date of physical test, surgeon's file number, and a symbol indicating the physical condition of the employe.

The first routine of the employment office, following the acceptance of the applicant after physical examination, is the preparation of the service record card. This is usually about 5 x 7 inches in size and on one face is entered the employe's full name and address and personal signature, which is very useful for identification and protection in the matter of written orders for disposition of pay check, etc. Provision is also made for the name and address of the person whom the employe desires notified in case of sickness or accident. The balance of that side of the card is ruled off for entering the date and cause of beginning and ending service in each occupation.

On the reverse of the card is entered: Country of birth and race of the employe and same of parents; number of years in this country (if foreign-born); whether or not naturalized; whether married or single; number of children and whether or not family is in this country; age; ability to talk, read and write English, and read or write native language. I will frankly say that the answers to some of these questions are of far more interest to Uncle Sam than to the plant executives, yet they have a certain value at the plant; and in many cases the federal bureau would be unable to carry out important comparative charts were it not for data of this kind secured from industrial establishments. When completed the card is placed in a slotted envelope, exposing the employe's name, and filed alphabetically in the "live" file.

Simple Yet Effective Record

When the present employment system was inaugurated at South Chicago a little over nine years ago a register number was assigned to each card in the "live" file. This is a permanent number and does not change with shifts in occupations or employment. Since then each new employe has been assigned the next consecutive number. An ex-employe returning retains his old number. This simple scheme enables us to determine quickly the number of new men hired during any given period and has made possible some very interesting comparisons.

The complete record card can be prepared in less than two minutes by an experienced interpreter, who then makes out an employment slip which is given to the man. This shows his name, register number, occupation, and the name of the foreman to whom he is to report. He is also given a book of rules in his native language and personally conducted by a uniformed patrolman to his new foreman. On the way the patrolman takes him to the clock house and shows him how to ring in and out, then to the locker and wash room, so that he may be familiar with the sanitary equipment of the plant. He is also carefully directed over the proper route to follow to and from the gate nearest his department. The patrolmen are required to do this in an accommodating manner, and, when they deliver the new employe to his foreman, they remind the latter to give careful instructions in regard to safety rules and special hazards before putting him to work.

Care in Details is Essential

The employment slip given the man is taken up by the timekeeper, who has it signed by the superintendent of the department, and then uses it as the basis of his time-book entries and marks a pay roll number on it. Then it goes to the addressing machines to be entered on the printed pay rolls, and is at once returned to the employment office with a proof of the typed pay roll entry. A great deal of care is given to correctly spelling each name and checking the final typesetting, as the substitution of an "i" for an "e" would practically lose a name in the files.

An employment slip issued and entered in this manner is the only authority recognized for placing a name on the pay rolls. Periodically, the complete pay rolls are checked against the "live" files, with which they must exactly coincide.

Should an employe desire to transfer from one department to another, he is required to obtain the written consent of his superintendent on a special form. This is presented to his prospective new superintendent, and, if approved, is honored at the employment office as an order to transfer and the records changed accordingly.

Every encouragement is offered to employes to freely consult the employment agent on all questions affecting his relations with the company or for advice on other matters. These items are treated in absolute confidence by the labor department, and if complaint is made of improper conditions or equipment, or wrong acts of foremen, a full investigation is promptly made and followed through to a proper adjustment.

From time to time the service record of the employe is corrected by a history of his negligence or diligence, as the case may be. For instance, a monthly report is submitted by each department, showing the reprimands or lay-offs administered during the month, with the circumstances attendant thereto. This report is abstracted and filed in the envelope containing the record card. When an employe is injured that fact is entered in like manner, showing date, casualty department file number, and classification as to responsibility for the accident. If another similar entry is made on the same card the details of the cases are at once made known to the head of the safety department, who may thus be put on the trail of an habitually careless workman. This particular item of co-operation between employment and safety divisions has proved of real value. It does not follow that an employe twice injured through carelessness is removed from service, but it has been found advisable to shift an awkward workman from billet loader to caretaker, and in two cases revealed defective eyesight in men occupying hazardous positions who had grown old in service.

The very knowledge that he will be quizzed about recurring accidents is a stimulus to the worker to avoid them. Every practicable inducement is offered to retain an employe in the service, and the matter of issuing a pay-off slip, either because of resignation or dismissal, is especially scrutinized. These pay-off slips are made in sheets perforated in three sections and padded in book form and issued to superintendents.

How the Record is Filed

The top section is the stub retained by the department head, who records such data as he may wish. The second, or middle section, is required to be sent promptly to the labor department, and gives name, pay roll number, and the true cause for leaving the service. The third, or bottom section, is an order on the accounting department to pay off the employe. This he is required to bring in person to the employment office, where record is made on his service card, same being then transferred to the "dead" file. He is courteously asked his reasons for leaving, and an attempt is made to get an expression of his view of working for the company.

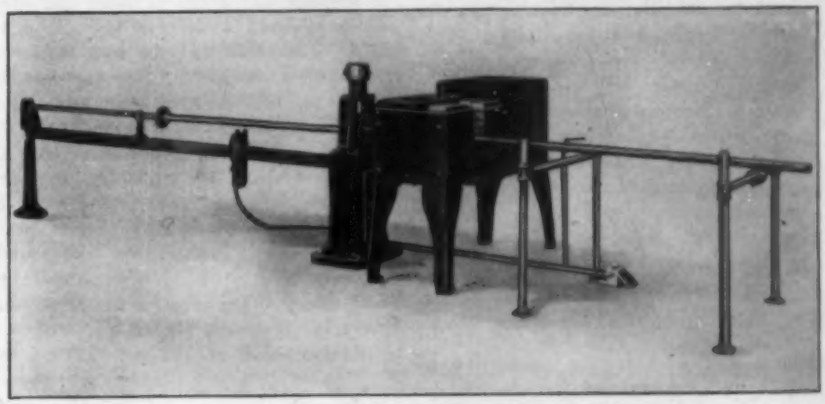
The head of the labor department

has authority to review all cases of discharge, and if, after full investigation he does not feel satisfied the best interests of the company are served by the dismissal of the employe, he reinstates him—usually by transfer to some other department. Likewise, if a man quits because of peculiar conditions in one mill which are not present in another a transfer is suggested.

The opportunities of the employment manager to efficiently serve his company are many and great. His opportunities to render true service to his fellow men and to be a real factor in the great movement of fellowship which is sweeping over industrial America are limitless. America is the melting pot that she is because each industrial plant, each social settlement, and each civic center in her broad expanse, is in itself a melting pot, and the employment chief is like unto a chef, in charge of the mixture at his particular plant. He it is who adds the flavor and skims off the dross.

Develops Safe-Ending Apparatus

Complete safe-ending apparatus consisting of a pneumatic flue welding machine, an oil heating furnace, racks and a mandrel on which the welding is done, has been developed by Joseph T. Ryerson & Son, Chicago. In the safe-ending operation the end of the tube is heated and belled, and the safe end inserted. The two sections to be welded pass through the furnace and over the mandrel until the welding point is in position in the furnace. When the metal has been heated to the proper welding temperature the tube and safe end is pushed further along on the mandrel until the point to be welded is in position for the hammers to complete the welding. A stop or guide on the mandrel set at the proper point controls the air supply to the welding machine when the tube is pushed against it. When the welding is completed and the tube withdrawn the air valve is closed automatically. The safe-ending equipment is shown in the accompanying illustration.



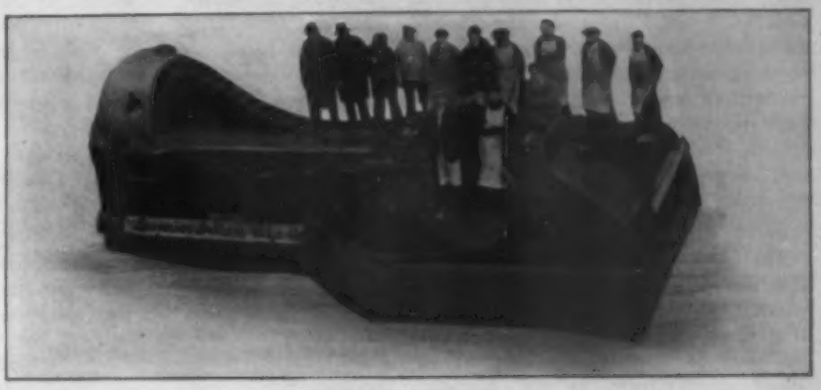
COMPLETE SAFE-ENDING EQUIPMENT

Builds Large Pattern

What is said to be one of the largest patterns ever built in the United States has just been completed by the Superior Pattern Works Co., 1247 Marquette road, Cleveland.

The pattern was made for the Worthington Pump & Machinery Corporation, Snow-Holly plant, Buffalo, N. Y., where it will be used for the erection of three large gas engines for the Youngstown plant of the Carnegie Steel Co. The pattern is for the main frame of the engine and is 30 feet long, 11 feet high and 11 feet wide. Six expert patternmakers worked steadily for three months to complete the job, which required about 20,000 feet of lumber. The size of the pattern is indicated by the men in the accompanying illustration.

It will take approximately a month to make a mold from the pattern, and unusual care must be exercised to guard against the loss of the casting, which will weigh about 10 tons. The completed engine will develop 6,000 horsepower.



MAMMOTH PATTERN FOR GAS-ENGINE FRAME

Steel Manufacture in South China

A critical situation has been reached in the production of pig iron and the manufacture of steel and general steel products in south China, and the indications are that in the next few months there will be some important developments, according to a report from Consul General Anderson at Hongkong to the department of commerce. Negotiations have been undertaken by various Japanese interests looking toward the acquisition of certain mining rights in south China and for the inauguration of a steel-making plant in or near Hongkong for serving the south China trade, especially in the line of rolled iron and steel not exceeding 5 inches cross dimensions and steel plates not exceeding ½-inch in thickness, for which there is a strong demand in this market and which can be manufactured in a plant of comparatively small cost.

A concern, the Hongkong Steel Foundry Co., Ltd., was organized five years ago for the purpose of making steel ingots from scrap, or, if the demand justified, from pig iron. The company has slowly developed its business until it is now operating two double sets of four furnaces each using scrap steel and pig iron. Its object, as indicated in its report, has been the development of a pig iron and steel manufacturing plant to handle ore deposits in south China. With a view to such development the company has an option on several hundred acres in the Waichow district of Kwangtung province and has plans for a complete plant, including railway and other transportation service to and from Hongkong and Canton. The sanction of the Chinese authorities only is now awaited for the advancement of the undertaking. However, outside capital is needed, and because of general business as well as war conditions it seems likely that

the capital must come either from Japan or from the United States.

There seems to be no question that there is an exceptional opportunity for the investment of American capital in such an undertaking, says Mr. Anderson, for the local demand for the output is so strong and material ordered from Europe or the United States is so slow in arriving that the concern now in the field has much more than it can do. Apparently the cost of manufacture here even under present conditions can compare favorably with costs in Europe and the United States, while the advantage of freights under present conditions is in itself great enough to overcome many difficulties. The advance in development of the iron-working industry in south China is of the greatest importance industrially and otherwise, and much of the future prosperity of this portion of China hinges upon the domestic production of iron and steel products.

Boron as a Deoxidizer

The American Boron Products Co., Reading, Pa., has issued a folder in which R. A. Wood, publisher of *The Waterbury Book of Alloys*, describes his tests of boron-copper, one of the alloys manufactured by the American Boron Products Co. Mr. Wood says:

"The use of boron does not require the skill of an experienced metallurgist, but it may be handled by the melting crew along with the usual fluxes such as salt, charcoal and borax.

"My first experience with boron as a flux was with 10 per cent German silver. Boron-copper was the medium used for the introduction of boron into the molten metal. Owing to certain circumstances it was necessary to make the 10 per cent German silver out of all scrap, and an all-scrap mixture of the nickel alloys often presents a serious problem to the melter. The scrap included clippings from spoon and fork blanks returned to the mill by the manufacturer. This scrap was melted down in crucibles holding 210 pounds of metal. At the first signs of melting, four pounds of boron-copper were added to the mixture. The metal was then brought up to a temperature of about 3,300 degrees Fahr., and well stirred, after which it was cooled down to a pouring heat and poured into cast iron molds 6½ inches wide and 1¼ inches thick. The bars were then rolled without previous annealing to ½-inch without showing edge cracks. They were then annealed and rolled to the finished thickness. The final inspection showed a smaller percentage of discards than was the case when all new metal was used for the mixture. The same methods were tried with 15 per cent, 18 per cent and 21 per cent German silver scrap and in each instance satisfactory results were obtained. The amount of boron-copper used was cut down to two pounds per crucible without changing the mixture."

The boron products manufactured by the American Boron Products Co. and the uses to which they may be put are as follows: Boron-aluminum, for hardening aluminum castings and densifying aluminum bronzes; boron-copper, for deoxidizing and alloying; boron-copper alloy, for toughening and purifying brasses and bronzes and for solid copper castings of low conductivity; boron-copper for solid copper castings of high conductivity; boron-copper for tough solid copper castings of high conductivity; boron-copper-aluminum for aluminum castings and bronzes; boron-copper-nickel for nickel steel; boron-copper for uniting copper and lead; boron-copper plastics for anti-friction bearings; boron-copper plastics for gaskets used in superheated steam engines; and boron-nickel for general use where nickel is alloyed.

Industrial Fellowships

The University of Michigan announces a course in chemical engineering, and graduate fellowships in gas engineering, metallurgy, paint and varnish manufacture and pulp and paper manufacture. In addition to the university fellowships there are seven industrial fellowships which are under control of the department of chemical engineering. Three of these fellowships are maintained by the Detroit Edison Co., the Detroit Copper & Brass Rolling Mills, and the Detroit Steel Castings Co. The Detroit Edison fellowship covers a course in chemical engineering, the company providing the sum of $600 annually for the investigation of metals used in the construction of central station equipment. The Detroit Copper & Brass Rolling Mills has given $600 for the investigation of methods to produce better copper and brass products. A similar amount has been given by the Detroit Steel Castings Co. for studies which may lead to the production of better steel castings.

A process of concentrating nitric acid has been invented by F. C. Zeisberg, Wilmington, Del. The patent has been assigned to the Du Pont de Nemours Powder Co., of the same city. The process consists essentially of passing nitric acid together with sulphuric acid, a dehydrating agent, into a chamber. Nitric acid is driven off from this solution by bringing into contact vapors from a boiling solution of sulphuric acid. The nitric acid vapors are condensed and the remaining oxides of nitrogen recovered by absorbing them in water. The diluted sulphuric acid is continually removed.

Coal Production Increases

The annual report of the United States geological survey has just been issued in which figures dealing with the production of coal in 1915 are given. The car shortage which prevailed in the last part of 1915 had a profound effect upon the coal mining industry. While the country as a whole produced more coal, both anthracite and bituminous, in 1915 than in 1914, some fields showed a decrease.

The improvement in business, to which the increase in the production of coal has been attributed, did not begin in all regions at the same time nor was the influence felt equally in all localities. The increased demand for coal was first felt in the manufacturing centers in the central seaboard states and extended as far west as Chicago. The increase in production in this territory was due also to the storage of coal by those consumers whose supplies came from unionized coal fields in which the old wage agreements expired April 1, 1916. The policy of preparedness was followed since there was considerable apprehension with regard to the new wage agreements and the possibility of a shutdown loomed upon the horizon in no small manner. As a result, coal was bought far in excess of needs and it is believed that not less than 10,000,000 tons of bituminous coal were put in storage. The southern Appalachian states and the territory west of the Mississippi and south of Iowa including Texas showed a decrease compared to 1914. The revival of the iron and steel business in Alabama came too late in the year to overcome the depression which had existed during the first half.

The state of Pennsylvania led all others in both the quantity and the value of coal produced. West Virginia and Illinois follow in the order of rank. Ohio regained fourth place as regards quantity after a lapse of one year to fifth place. The coal fields of Pennsylvania produced 88,995,061 tons of anthracite coal, or 16.8 per cent of the total production of coal in the United States, and 157,995,137 tons of bituminous coal or 29.7 per cent of the total coal produced in the United States. West Virginia followed with 77,184,069 tons. Illinois 58,829,576 tons and Ohio 22,434,691 tons. The total production in the United States for 1915 including both bituminous and anthracite was 531,619,487 tons, an increase of 18,094,010 net tons over the total 1914 production.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

E. B. MERRIAM, formerly assistant engineer, switchboard department, General Electric Co., has resigned to become head of the industrial service department recently organized to supervise education, employment and provision of opportunities for advancement of employes at the company's Schenectady plant. Mr. Merriam brings to his new position a broad and sympathetic understanding of the requirements of the situation. He has been connected with the General Electric Co. for 16 years, starting as a student in the testing department and later doing service in commercial, manufacturing, engineering development and research work. Mr. Merriam is well known among electrical men as a prominent member of the American Institute of Electrical Engineers and particularly for his work in connection with high voltage automatic circuit interrupting apparatus. He has contributed a number of technical papers to electrical engineering societies on protective apparatus. He was chairman of the Schenectady section of the A. I. E. E..

Hon. Marcus A. Coolidge, president of the Fitchburg Machine Works, Fitchburg, Mass., and family, are making a visit to Honolulu.

B. Langham, purchasing agent for the Canadian Northern railway in western Canada, has been appointed chief purchasing agent with headquarters in Toronto.

J. T. Slatter, former manager of the freight bureau of the Merchants' and Manufacturers' association, Birmingham, Ala., has gone to Montgomery to open a freight and traffic bureau in that city.

H. A. Rapelye, representative of the Terry Steam Turbine Co., Pittsburgh, recently was elected chairman of the mechanical section of the Engineers' Society of Western Pennsylvania.

Samuel Adams, associated with the American Sheet & Tin Plate Co., at Sharon, Pa., on Feb. 15 will become superintendent of the hot mills at the plant of the McKeesport Tin Plate Co., McKeesport, Pa.

H. W. Finnell, vice president of Templeton, Kenly & Co., Ltd., 1020 South Central avenue, Chicago, manufacturers of car and track jacks, was elected a director of the company at the recent annual meeting.

Spencer Weart, second vice president of the Bound Brook Oil-Less Bearing Co., Bound Brook, N. J., has been elected president and George O. Smalley, general manager, has been made treasurer.

Vice President G. J. Bury, of the Canadian Pacific railway, will go to Russia to acquire information in connection with transportation problems, as the company is handling large quantities of Russian freight via Vancouver and Vladivostok.

R. J. Ward, formerly associated

E. B. MERRIAM

with the Shepard Electric Crane & Hoist Co., at Montour Falls, N. Y., now is identified as a sales engineer with the Pittsburgh office of that concern, with headquarters at 1212 Benedum-Trees building.

W. E. Reed, consulting engineer, talked about "Street Lighting Specifications", Feb. 13, at a joint meeting of the Pittsburgh section of the American Institute of Electrical Engineers and the Pittsburgh section of the Illuminating Engineering Society.

A. E. R. Schneider, Cleveland, of the Cleveland-Cliffs Iron Co., has been elected vice president of the Grand Island and Presque Isle Steamship companies, succeeding the late J. H. Sheadle. Mr. Schneider is in charge of the vessel department of the company and is the active manager of the Cleveland-Cliffs fleet.

H. K. Bourne has become a member of Oglebay, Norton & Co., Cleveland. Mr. Bourne has been associated with this company for 23 years and during recent years has devoted his time principally to handling the sales of iron ore. He has a large acquaintance among the men in the iron and steel and iron ore industries.

J. J. Dillon recently resigned as manager of the New York office of the Supplee-Biddle Hardware Co., Philadelphia, to become associated with the Trumpbour-Whitehead Brass & Copper Co., 307 Canal street, New York. He has been succeeded by A. R. Levin, who for the past seven years was identified with the Riverside Metal Co., Riverside, N. J.

Michael Geoghegan has resigned as manager of the contract department of Davies, Turner & Co., New York, and B. F. Hernandez as manager of the steamship department of that company, to devote their time to the Freighters Transportation Co., 42 Broadway, New York, of which Mr. Geoghegan is treasurer and Mr. Hernandez, secretary.

John C. Jay Jr., formerly vice president and general manager of sales of the Pennsylvania Steel Co., has resigned as vice president and director of the Maxwell Motor Co. Mr. Jay withdrew from the steel business to become chairman of the Maxwell Motor Co. and recently has been succeeded in that position by James C. Brady.

E. M. Herr, president of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Capt. Robert Dollar, president of the Robert Dollar Co., San Francisco, and Dr. Frederick W. Hinitt, president of Washington and Jefferson college, were speakers at the second annual banquet of the Pittsburgh Chapter of the American Institute of Banking, Feb. 6.

A. W. Hartigan has been appointed sales manager of the Electrical Alloy Co., Morristown, N. J., manufacturer of high grade resistance materials, and will have headquarters at 41 Union square, New York. Mr. Hartigan formerly was connected with the New York sales department of the Western Electric Co. The Electrical Alloy Co. now is occupying a large modern plant just completed which will increase its production materially.

Charles J. Stark Appointed Editor

The Iron Trade Review Announces Important Promotions and Changes—New Editor Has Had Wide Experience—E. C. Kreutzberg and Guy F. Creveling Appointed to New Posts

CHARLES J. STARK, of New York, has been appointed editor of *The Iron Trade Review*, to fill the position formerly occupied by George Smart. Mr. Stark has been connected with the editorial staff of *The Iron Trade Review* for over a decade. He brings to his new position the fruits of mature study of the iron and steel industry of the United States as well as the broad viewpoint resulting from a wide acquaintance among both producers and consumers of iron, steel and machinery products.

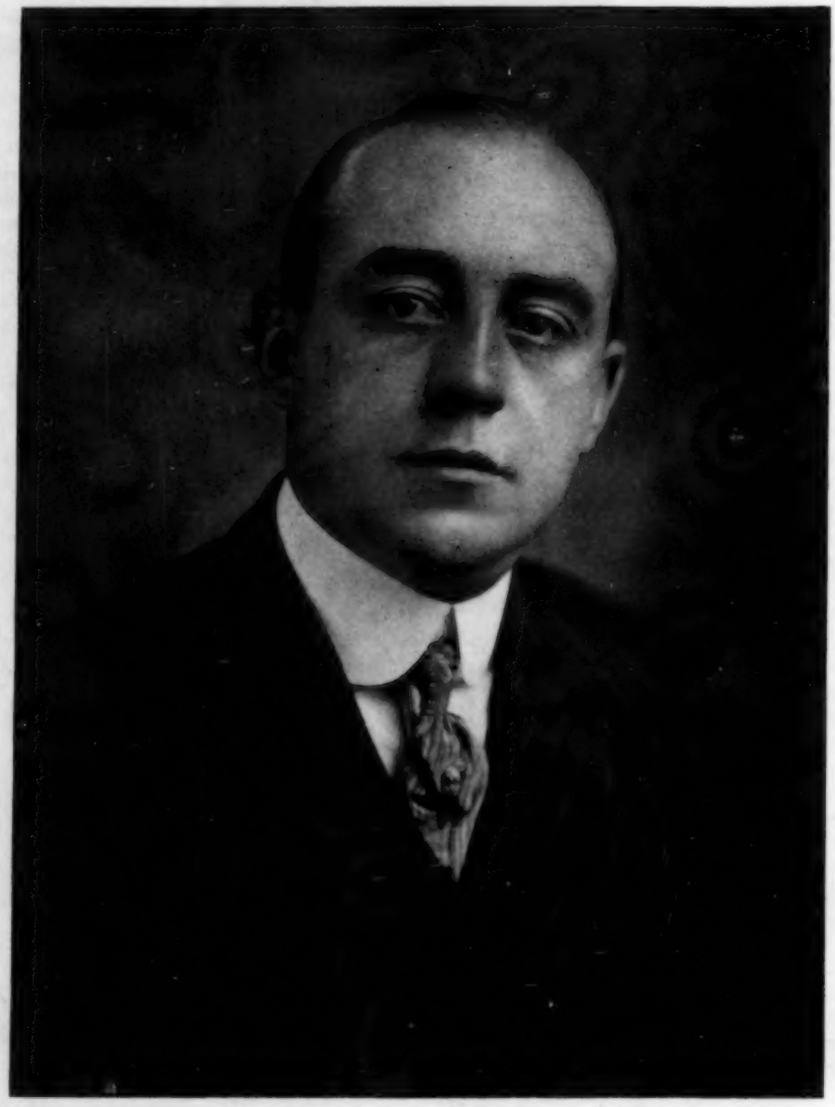
Mr. Stark is a native of Wooster, Ohio. At an early age he removed with his parents to Findlay, Ohio, where he received his primary and secondary education, graduating from the Findlay high school. During the following two years he worked as a reporter on a Findlay newspaper and then entered Ohio State University, where he specialized in law and journalism.

He left the university and after three more years of newspaper work he joined the staff of *The Iron Trade Review*, as associate editor at Cleveland, January 1, 1907. About a year later, in February, 1908, he became Pittsburgh representative. In February, 1910, he was transferred to New York and since that time has had charge of the metropolitan office of The Penton Publishing Co., publisher of *The Iron Trade Review* and *The Daily Iron Trade and Metal Market Report*. His work in the field has brought him in contact with both the commercial and technical aspects of the iron and steel industry. Mr. Stark will assume his new duties in Cleveland about April 1.

To fill the vacancy created by the promotion of Mr. Stark, Edgar C. Kreutzberg, who has been connected with *The Iron Trade Review* since August, 1910, has been appointed associate editor in charge of the New York office. Mr. Kreutzberg also will continue to act as associate editor of *The Daily Iron Trade and Metal Market Report*. Mr. Kreutzberg has been in the New York office of The Penton Publishing Co. for four years and is thoroughly familiar with the eastern field. Prior to his transfer to New York he was attached to the home office staff of *The Iron Trade Review*. He has also had practical experience in the foundry business. He was educated in Wisconsin public schools and later attended Princeton University.

Mr. Kreutzberg's former position in the New York office will be filled by Guy F. Creveling of Cleveland, who has been connected with *The Iron Trade Review* and *The Daily Iron Trade and Metal Market Report* since October, 1912. As financial editor, Mr. Creveling has devoted special attention to the domestic and foreign problems of the iron and steel business and his new location at the financial and export center of the country will give him an opportunity to continue his studies along this line. Mr. Creveling, who was born in Mansfield, Ohio, has also had practical factory experience in the installation of cost finding systems.

In addition to Messrs. Stark, Kreutzberg and Creveling, the permanent editorial staff of *The Iron Trade Review* includes H. Cole Estep, editorial director and engineering editor, Cleveland; C. F. Williams, associate editor, Pittsburgh; R. V. Sawhill, associate editor, Cleveland; L. W. Moffett, Washington, D. C.; George H. Manlove, Chicago; Stan-



CHARLES J. STARK, EDITOR, THE IRON TRADE REVIEW

ley G. Backman, Cincinnati; Joseph Horton, Birmingham, England; E. L. Shaner, Ralph H. Jones, W. S. Doxsey, R. J. Anderson and E. W. Kreutzberg, Cleveland. In addition to its salaried staff, *The Iron Trade Review* maintains connections with over 30 correspondents located in all of the important industrial centers of the world.

Cement Show

In Chicago Reveals Growth of the Industry

Development of the cement industry is epitomized in the exhibits at the tenth Chicago cement show in the Coliseum. By clever arrangement of space it has been possible to house the entire show in the one building instead of placing part in another structure, as in the past.

Exhibits to the number of 179 present the industry and its growth to the observer. The range is from cement itself through the various reinforcing materials, appliances for mixing and molding the concrete, trucks and conveyors for handling materials up to the artistic touch that makes possible the production of beautiful ornamentation.

As is usual in every show, a few outstanding features present themselves. This year there are two: The increasing use of machinery and the development of the artistic possibilities of cement. Machinery now does practically every detail of the work. Its makers believe in showing the prospective buyer just how the device works, and operating exhibits were much in evidence. Cement blocks were molded while the observer waited. Elevating and conveying was demonstrated. Machinery to span a full-width roadway and perform every operation on its surface until it is finished, indicate the extent to which hand labor is being displaced by mechanical means.

Development of giant trucks to carry material at low cost and with sufficient speed to keep up with large projects is shown in the self-dumping cars. Oiling and sprinkling tanks of gigantic size on powerful motor trucks make the work of the road builder easier.

Of interest to the iron and steel world is the large use made of iron and steel materials in equipping the cement worker for his task, in addition to the reinforcing materials placed in the concrete. In spite of the fact that cement was the text of the entire exhibit, and every feature was closely allied with that industry, the dependence on steel is evident and it is patent that the two are linked in a common bond to produce the result that gives the show its slogan, "Concrete for Permanence".

The American Steel & Wire Co. exhibited its triangle-mesh concrete reinforcement, showing its application in walls and road construction. The Blaw Steel Construction Co., Pittsburgh, had an interesting exhibit of steel forms and centering for sidewalk, road, wall, sewer, tunnel and many other forms of construction. The Calumet Steel Co., Chicago, exhibited its line of reinforcing bars, angles, flats and structural steel tubing. The Carnegie Steel Co., Pittsburgh, showed steel shapes and bars and piling sections. A wide variety of cement mixers was exhibited. Among them were the devices of the Blystone Mfg. Co., Cambridge Springs, Pa.; the Chain Belt Co., Milwaukee; the Archer Iron Works, Chicago, and the Foote Concrete Machinery Co., Chicago.

The Hydraulic Pressed Steel Co., Cleveland, showed a line of pressed steel forms for building purposes. The Illinois Steel Co. showed its plain bars and twisted squares for reinforcement.

The manufacturers of Portland cement followed the custom of preceding years and concentrated their efforts in a joint exhibit for the general good of the cause instead of each pulling separately for individual brands. This exhibit was most instructive in setting forth the usefulness and the varied applications to many forms of construction of this material.

In the annex, the National Association of Mixer Manufacturers showed their machinery, much of it in actual operation, presenting a wide variety of design and application.

Tungsten Products Active

New York, Feb. 10.—The demand both for tungsten concentrates and ferro-tungsten continues active. A large amount of export business, however, continues to be held up by reason of the submarine menace to shipping. Prices show no change. Sixty per cent tungsten concentrates may be quoted at $14 to $16.50 per unit, while concentrates containing a higher content command a premium. On ferro-tungsten, one large order was offered at less than $2, but owing to special considerations attaching to this offer, this level does not portray the market. Seventy per cent material may be quoted at $2 to $2.25, with sales of 5-ton lots at the outside figure.

Sentiment in the tungsten market is much firmer than a week ago. The expectation of the trade generally is that the entrance of the United States into hostilities with Germany would be an immediate cause for a greatly stimulated production of all materials and products required in waging warfare under modern methods and it is considered as probable that such a tendency would mean a greatly enlarged demand for tungsten with a corresponding hardening effect upon prices.

Wharton Officers

New Company Elects Board and Chooses Executive Heads

New York, Feb. 12.—J. Leonard Replogle, formerly vice president and general manager of sales of the Cambria Steel Co., has been made chairman of the new Wharton Steel Co., which recently acquired the furnaces, ore lands and other property of the Jos. Wharton heirs. H. S. Endsley, of Philadelphia, former chief counsel of the Cambria Steel Co., will act as president until an operating man is picked. The other officers are: Vice president, Ernest Hillman, of J. H. Hillman & Co., Pittsburgh; vice president and treasurer, I. Townsend Burden, of New York; secretary, H. S. Wenner, of Philadelphia, formerly secretary of the old Wharton Steel Co. The directors are: Messrs. Replogle, Endsley, Hillman, Burden, Jas. J. Flannery, president of the American Vanadium Co., Pittsburgh; J. Rogers Flannery, Pittsburgh; Chas. McNeil, of New York, president of the Utah Copper Co.; Harry Payne Whitney, of New York; L. W. Baldwin, president of the Empire Trust Co., New York; and L. E. Waring, of New York. The officers of the Wharton & Northern railroad are: President, Mr. Replogle; vice president, Mr. Endsley; secretary and treasurer, Mr. Wenner. The Wharton Steel Co. is capitalized at $10,000,000, of which $8,000,000, all common, has been issued. Plans are being shaped to blow in the first of the Wharton, N. J., group of furnaces around April 1, or earlier, and the other stacks at later dates. Bessemer will be produced to fill large exports which the company recently has taken.

President Gartland, of the Gartland Toledo Foundry, was in Sandusky, O., two days ago and reports most of the machinery for the new plant in that city has arrived and will be set up immediately. The plant will be in operation in 30 days and plenty of orders are on hand to keep it occupied for several months. J. J. Carroll is the manager of the branch.

Business News of Nation's Capital

Senator Pomerene Offers Four Amendments to Webb Export Bill—War Preparations Are Continued by Government Assisted by Many Loyal Industries —Many Merchant Ships Available

WASHINGTON, Feb. 13.—Carrying amendments which are intended to remove restricting provisions added to it on the floor of the house when it passed that body at the first session of the present congress, the Webb export bill has been reported favorably from the senate committee on interstate commerce. It is the purpose of Chairman Newlands, of the committee, to take the bill up in the senate as soon as possible with a view to passing it before congress adjourns. The bill as now drafted is understood to meet with the approval of the administration and will be given its support. Senator Cummins, a republican member of the committee, however, is opposed to the bill in its present form and is preparing a minority report on it. With other senators, including LaFollette and Poindexter, republicans, and Reed, democrat, Cummins is said to have determined to fight passage of the measure and may participate with them in a filibuster against it.

The bill as reported by the senate committee carries four important amendments, all of them offered by Senator Pomerene, democrat. One of these amendments strikes out the objectionable phrase of the house bill which provided that the export combinations legalized by it should not "restrain the export trade of the United States". It has been pointed out that, as a matter of course, the associations would in a technical sense restrain the export trade of the United States, but at the same time would offer an agency for greatly building up foreign business without illegally injuring the export trade of any concern of the country not connected with the association. The Pomerene amendment provides that the associations shall not restrain the export trade "of any domestic competitor of such association", reading as follows:

" . . . And is not in restraint of the export trade of any domestic competitors of such association. And provided further, that such association does not, either in the United States or elsewhere, enter into any agreement, understanding or conspiracy, or do any act, which artificially or intentionally and unduly enhance prices within the United States of commodities of the class exported by such association."

"The house authorized the organization of associations for the purpose of engaging in the foreign trade, provided, however, that they should not result in restraint of trade in the United States, and should not result in restraint of export trade," said Senator Pomerene to *The Iron Trade Review*. "Reduced to the final analysis, the house said associations may be organized to restrain trade, provided in fact, they did not restrain trade. The house, therefore, took away with one hand what it gave away with the other.

"One amendment to the senate bill provides that these associations shall not be in restraint of trade within the United States, provided further they shall not restrain the export trade of a domestic competitor, and again it prohibits them from artificially or intentionally and unduly enhancing prices to consumers in the United States of the same goods, wares and merchandise in which the associations deal."

Another amendment strikes from the house bill the requirement that all contracts, agreements and understandings of the association had with any foreign or domestic association in regard to the conduct of or practices in foreign trade shall be reported to the federal trade commission. Members of the associations by this provision would have been compelled to make public every detail relating to their business. In place of this, the Pomerene amendment provides that the associations shall furnish the "commission such information as the commission may require as to the organization, business, conduct, practices, management and relation of other associations, corporations, partnerships and individuals." The information in consequence would be supplied only at the request of the commission and presumably would be called for only in case there was a suspicion that the law was being violated.

The house bill would have given direct authority to the attorney general to deal with violations or alleged violations. But an amendment by Senator Pomerene gives to the commission authority, when it has reason to believe the law has been or is being violated, to summon the association, its officers and agents to appear before it, and to conduct an investigation. Upon investigation, if the commission shall conclude that the law has been violated, the commission may make to such association recommendations for the readjustment of its business, in order that "it may thereafter maintain its organization and management and conduct its business in accordance with law." Failure to comply with the recommendations of the commission would result in the latter referring "its findings and recommendations to the attorney general for such action as he may deem proper."

Another essential change was made by the senate committee, and relates to the first section of the bill; it states in part, "That the words 'export trade' wherever used in this act mean solely trade or commerce in goods, wares, or merchandise exported, or in the course of being exported from the United States or any territory thereof to any foreign nation; but the words 'export trade' shall not be deemed to include the production, manufacture, trading in, or marketing within the United States . . . . . of such goods, wares, or merchandise, or any act in the course of such production or manufacture."

The senate committee struck out the words "trading in, or marketing," and substituted the words "or selling for consumption". This gives an entirely different turn to the section, and is held to be consistent with the purposes of the bill. The federal trade commission, the foreign trade council and other organizations supporting the bill protested against the use of the words "trading in, or marketing". They maintained that by preventing the trading in or marketing it would be practically impossible to carry on foreign business. It was pointed out that all foreign combinations must trade in such products in the United States, unless its members actually manufacture them.

Preparedness Activities

Washington, Feb. 13.—Extreme but quiet activity is being made by the government to prepare for war. Large orders for military requirements of all kinds have been placed and more are being placed. This will mean added pressure upon such establishments as steel and ship building plants, and all others that can in any way contribute to the preparedness movement. Mobilization of these industries has been considered by the council of national defense, and its advisory commission.

Agents of the government are making a tour over the country to ascertain precisely what its industries may be able to do. Considerable information in this direction has been given by hundreds of private manufacturers who have offered to place their plants at the disposal of the government. Many of these are steel and ship building plants, foundries and machine shops. In view of the fact that actual invasion of the country by an enemy is not imminent, government officials are prone to believe that the country is in a position to meet any probable eventualities of the immediate future. But the country is apparently in an almost hopeless condition of industrial preparedness. Its lack of an adequate army and navy of trained men to meet an invasion in the near future at the hands of a formidable enemy is just as startling.

Authority Given Shipping Board

By a proclamation issued by the President, the shipping board has been authorized to prevent the transfer of merchant ships under American registry to alien ownership, and vessels now building in private yards could be commandeered by the government by means of legislation now before congress. An amendment proposed for the naval bill also would give the government authority to commandeer all private ship building plants, as well as steel, ordnance and other establishments. A provision of the amendment which would permit the government to draft officials and employes of these private establishments into the government service was struck out at the request of Secretary of the Navy Daniels. Such services, however, would be used in case of emergency. The amendment also gives authority to suspend the eight-hour law so that the employes can be put on more than one shift. Prices for the material obtained from such plants would be determined by the secretary of the navy. By some, it is claimed, the plan to commandeer private plants is unnecessary in view of the fact that such authority is already vested in the war department by the national defense act. It has been contended that, because of this fact, the navy department should restrict its right to commandeer to private ship yards. Moreover, the argument is made that the owners of the plants have already shown through their voluntary offers to place these establishments at the disposal of the government that it would not require legislation to obtain their services. There has been no known objection, however, from manufacturers and ship builders to the pending legislation. Another amendment has been proposed by which bonds would be sold to raise $150,000,000 to insure expeditious construction of vessels.

The bureau of navigation, department of commerce, has made a survey for the navy department which shows that there are 27,646 merchant ships of an aggregate tonnage of 10,527,632 now built or building under American jurisdiction. A careful report on the condition, ownership and location of all of these vessels has been compiled to be used in determining the order in which vessels will be taken over and the uses to which they would be put. It also has been announced that construction of naval craft by the Newport News Ship Building & Dry Dock Co., the Fore River Ship Building Corporation and the Electric Boat Co. will be speeded up to the limit, the eight-hour law being suspended. Similar action has been taken with regard to vessels under construction at the navy yards. The Newport News company, it is said, can complete the battleship MISSISSIPPI by midsummer instead of Jan. 1, 1918, as called for in the contract. Reports of like character come from other private yards showing what can be done in hurrying the construction of various types of vessels.

Corporation Will Help

New York, Feb. 10.—"Anything can be done in case of need," Chairman E. H. Gary, of the Steel Corporation, has replied to an inquiry as to what extent the output of the Steel Corporation would be placed at the disposal of the government in case of war. Judge Gary estimates that the Corporation's output in the lines which it manufactures is approximately one-third greater than the production of entire Germany in the same materials. A considerable part of this output already goes to the government, including armor plate, navy and army shell forgings, torpedo parts, shell steel for rifle barrels and gun carriages, barbed wire and wire of all kinds, ship plates and ship parts, steel for cartridges and cartridge castings, benzol, toluol and sulphuric acid.

The Steel Corporation, according to Judge Gary, can produce monthly 1,250 tons of armor plate; 28,000 tons of shell forgings; 45,000 tons of wire products; 200,000 tons of plates and structural materials for ships and 7,000 tons of spelter. The Corporation's monthly output of benzol is 900,000 gallons, of toluol 134,000 gallons, and of sulphuric acid 12,000 tons.

The total monthly capacity of the Corporation's plants is placed at 1,450,000 tons of pig iron, 1,770,000 tons of ingots, and 1,285,000 tons of finished steel.

Companies Expand

New Buildings Now Being Erected Will Greatly Increase Output

With the addition of two new buildings that are now being erected to the Atlas Bolt & Screw Co. and its subsidiary, the Atlas Car & Mfg. Co., the new plant on Ivanhoe road, Cleveland, will cover a ground area of six acres. The output will be approximately double that of its former capacity and 500 men will be employed. The buildings now being erected are of brick and steel construction and have tile roofs. The bolt and screw building will be 170 x 375 feet. A wing 60 x 150 feet will be added to the car manufacturing building, which is 100 x 400 feet at the present time. The latter will have a mezzanine floor and will be used principally for the construction of electric locomotives and electric shop and railroad terminal tractors. The office building, 60 x 150 feet, will also house the engineering and drafting departments. All buildings are of the monitor type and will be completed by the first of June. Practically all the equipment for the new structures, including 75 bolt machines has been purchased. Plans were prepared by the W. S. Ferguson Co., while contracts were awarded to the deHamel and the Campbell-Cockburn Construction companies. Steel is being furnished by the Penn Bridge Co. and the Forest City Steel & Iron Works. The plant formerly occupied by the Atlas companies situated on Marquette road has been purchased by the K D Carburetor Co., Cleveland.

Safety Men Elected to New Positions

"Safety first in industry" is the slogan of the New England branch of the National Safety council which had its annual meeting in Boston, Feb. 7. H. G. Smith, vice president and general manager of the Fore River Ship Building Corp., Quincy, Mass., was elected president; C. E. Paige, of the Malden & Melrose Gas Co., B. R. Sheak, general manager of the Thomas G. Plant Shoe Co., Boston, T. G. Toomet, protection manager of William Filene's Sons Co., Boston, and J. A. Falthers, Boot Mills, Lowell, Mass., were appointed vice presidents, and E. B. Saunders, Simonds Mfg. Co., Fitchburg, Mass., was elected secretary-treasurer. The next meeting will take place at the Boston city club during the first week of March, when a general campaign, under the supervision of the program committee will be started.

Iron and Money: Fact and Comment

Steel Stocks Hold Their Own Despite War Talk—Some People Predict Bigger War Boom Than Ever—Fuel Shortage Cuts Production and Reduces Earnings

WAR and its rumors have cast shadows over the market, creating uncertainty but not loss of confidence. Since the sharp break which first greeted the German announcement of unrestricted submarine warfare steel stocks have been unsettled, but have not declined perceptibly. Possibly this firmness indicates belief that the submarine campaign will not greatly interfere with exports of steel and munitions; perhaps Wall street feels that domestic consumers will absorb any surplus thrown back upon the market because of inability to ship; in any event the stock market does not presage fulfillment of the German threat.

On the other hand, the momentum given the preparedness movement by the approach of the nation to the verge of war is expected to result in immense purchases of military supplies. Some people predict the introduction of enormous new buying power which may be given the United States government through an issue of war bonds, will inaugurate a war boom in both stock and commodity markets which will dwarf anything seen heretofore. Industries already are being driven to capacity with production insufficient to go around. The effect of the impending new demand remains to be seen.

The iron and steel markets are firm, with production curtailed because of fuel and labor shortages. This reduction will be reflected in earnings, but Wall street as yet has paid little attention to such details in the face of the important international developments. Quotations on a number of leading iron, steel and industrial stocks at the close of the New York stock exchange, Feb. 10, and net changes for the preceding week follow:

	Close Feb. 10.	Net chg.
American Can	42⅜	— ⅛
American Can, prfd.	107½	+1½
American Car & Fdy.	62¾	+1¾
American Car & Fdy., prfd.	117	— ⅛
American Locomotive	70¾	+2¾
American Locomotive, prfd.	104	+ ½
American Steel Foundries	59⅞	+4⅜
Baldwin Locomotive	53⅜	+6⅜
Baldwin Locomotive, prfd.	100½	+ ½
Bethlehem Steel	391	—9
Bethlehem Steel, prfd.	...	...
Colorado Fuel & Iron	43¾	+ ¾
Continental Can	87	+4
Continental Can, prfd.	110½	+1½
Crucible Steel	65⅛	+7¾
Crucible Steel, prfd.	111	+4
General Electric	162	—1
Gulf States Steel	117	+11
Gulf States Steel, 1st prfd.	103	+1
Gulf States Steel, 2nd prfd.	117	— ½
Internat'l Harv. of N. J.	113	—1½
Inter. Harv. of N. J., prfd.	120	—1
International Harv. Corp.	78⅝	—2⅜
Lackawanna Steel	75	+ ¼
Nat'l Enmlg. & Stmp. Co.	29¾	+2¾
Nat'l En. & Stmp. Co., prfd.	95⅛	—1⅛
Pressed Steel Car	76½	+ ½
Pressed Steel Car, prfd.	105½	+1½
Pullman Palace Car	160¾	+ ⅜
Republic Iron & Steel	75	+ ½
Republic Iron & Steel, prfd.	101⅛	+1⅛
U. S. C. I. P. & Fdy. Co.	20	+1⅜
U. S. C. I. P. & F. Co., pr.	60	+5
United States Steel	105½	+1½
United States Steel, prfd.	117¾	— ⅛
Westinghouse Mfg.	51¼	+2¼

Maximum quotations for a number of steel and industrial stocks, not listed on the New York stock exchange at the close of Feb. 9 and Feb. 2, follow:

	Feb. 9.	Feb. 2.
American Radiator	...	420
American Ship Building	60	63
Cambria Steel	100	...
Chicago Pneumatic Tool	68	72
LaBelle Iron Works	77	81
Lake Superior Corp'n	17⅜	19¼
Stewart-Warner Speed. Co.	88½	100
Warwick Iron & Steel Co.	9½	9½
Westinghouse Air Brake	152	154¾
Westingh'se Elec. & Mfg. Co.	53½	53¾

Financial Returns From 1916

The Stewart-Warner Speedometer Corporation's net earnings in 1916 were equal to about 22 per cent on its stock. The company added $2,105,968 to its surplus at the close of the year, bringing the total surplus to $4,195,144.

* * *

Stockholders of the Whitaker-Glessner Co., Wheeling, at their recent annual meeting, heard reports submitted showing that the company earned $4,868,656, in 1916, after bond interest and depreciation.

* * *

The Mansfield Sheet & Tin Plate Co., Mansfield, O., at its recent annual meeting declared an initial dividend of 2 per cent. On Feb. 1 the company issued $500,000 of 7 per cent preferred stock. The company has undertaken extensions which double the plant's capacity.

* * *

The Chicago Pneumatic Tool Co. earned a net profit of $1,003,422 in 1916, equal to 15.47 on its outstanding stock, as against $683,247 in 1915. Last year was by far the largest in the company's history, exceeding the previous high mark, 1913, by $247,726.

* * *

The Trumbull Steel Co., Warren, O., earned $56.12 a share on its $3,000,000 common stock in 1916, according to figures given out by President Jonathan Warner at the recent annual meeting of stockholders. Net earnings were about $2,000,000.

* * *

The American Steel Foundries, for the year ended Dec. 31, 1916, reports net earnings equal to 19.3 per cent on its $17,184,000 capital stock. The surplus of $3,418,857, applicable to dividends, compares with a deficit of $313,434 the previous year. No dividends have been paid and none are expected until near the middle of 1917.

* * *

The Driggs-Seabury Ordnance Corporation, Sharon, Pa., and subsidiary companies, report net earnings of $3,149,346 for the year ended Dec. 31, 1916. After all charges and preferred dividends, a surplus remained for common of $695,181, equal to 7.86 per cent on common stock. All of this surplus was disbursed to common stockholders except $35,492, which was added to the previous surplus of $258,577.

* * *

The Wheeling Mold & Foundry Co., Wheeling, has practically abandoned all munition work, President H. E. Fields told stockholders at their recent annual meeting. The shell making part of the company's business was not as profitable as had been hoped. However, the net profit from regular work in 1916 was equal to 42.37 per cent on the capital stock. Stockholders authorized the issuance of $500,000 preferred stock, to be issued as a stock dividend.

* * *

The Allis-Chalmers Mfg. Co., Milwaukee, reports the largest gross business of its history in 1916. Sales billed amounted to $19,440,509, against $11,666,413 the previous year. Net profits were $3,165,020, against $1,078,352 the previous year. The company paid off 4½ per cent in back dividends during the past year, leaving 10 per cent still unpaid. During 1916 the surplus for the $26,000,00 common shares equaled 8.36 per cent on that issue, compared with 0.3 per cent on the same stock the previous year.

* * *

The Charcoal Iron Co. of America, Detroit, earned $1,162,879 net in the year ended Dec. 31, 1916. Allowing for the full year's dividends on the $5,217,250 of 6 per cent preferred stock, there remained a balance of $849,844, equal to nearly $3 a share or 30 per cent on the common stock. The par value of both common and preferred stock is $10. The balance sheet shows total assets of $9,882,752 on Dec. 31, against $9,909,165 on Sept. 30. Current assets were $1,600,023, compared with $1,765,999, inventories having been reduced to $1,097,172 from $1,259,956 at the end of the earlier quarter. Property assets were $8,105,760, showing an increase of $40,434 for the quarter. Current liabilities were $487,141 reduced from $720,304.73 on Sept. 30, mainly through reduction of bank loans from $265,000 to $50,000. Reserves were $265,659 against $208,814 and surplus was $1,013,351 compared with $923,446 on Sept. 30.

The Pittsburgh Steel Co., Pittsburgh, has leased 36 offices in the Union Arcade building, that city, which will be ready for occupancy about April 1.

Will Prepare The Nation

Union Club at Cleveland Has Inaugurated Important Movement to Mobilize Iron and Steel Industry

ENERGETIC steps toward a general movement toward national preparedness from an industrial viewpoint were taken at a meeting of the Union club, Cleveland, Saturday evening, Feb. 10, at a specially called patriotic meeting of the membership.

A series of resolutions presented by Richard F. Grant, general counsel of M. A. Hanna & Co., was adopted. Thus the club placed itself on record as favoring a program for enlisting Cleveland industries in the general preparedness movement. The club named a committee to start a campaign to crystallize the interest of the city's industrial heads. Further, the news of the movement is to be spread broadcast to the end that the club's example will be followed by other industrial centers and thus the first step be taken to bring about national preparedness in a most practical way.

The club also unanimously adopted resolutions "approving the patriotic and courageous stand in behalf of freedom, of the rights of neutrals and of the rights of American citizens" by President Wilson, and these were wired to the President at Washington. These resolutions also tendered the earnest and most sincere support of the club members to the President in any emergency which may arise.

Cleveland manufacturers soon will start work on war supplies for the government. Orders to be placed probably will include almost everything Cleveland can furnish to Uncle Sam's fighting forces, from war trucks and aeroplanes to mittens and chewing gum. Plants of 256 manufacturers and merchants who could fill war orders are listed under the head of "Cleveland" among the records of the national commission on industrial preparedness.

Frank A. Scott, vice president of the Warner & Swasey Co. and associate member of the navy consulting board, has been active in obtaining the information regarding Cleveland plants which the commission on industrial preparedness is about to put to a practical test.

In an emergency it is estimated that Cleveland could mobilize at short notice an army of from 50,000 to 75,000 workers who could supply their quota of almost everything that is required by both sea and land forces. Mr. Scott directed attention to the diversity of Cleveland's industries.

"There are more iron and steel articles produced in the Cleveland district than in any other city in the world, not even excepting Birmingham and Sheffield, the great iron and steel centers of Great Britain," Mr. Scott asserted.

In the trial orders Cleveland is to receive, preference will be given to those manufacturers and merchants that have had experience in producing war munitions under contracts for the entente powers. The resolutions adopted by the Union Club are as follows:

RESOLVED that the Union club, of Cleveland, endorse the following principles:

FIRST: That each industry in this city, capable of war time service to the government, shall appoint men of ability and importance in the organization to make application for commissions in the Reserve Officers' Quartermaster Corps, non administrative.

SECOND: That in large industries such number of men shall be appointed as will give the best possible representation to each important department in the industry.

THIRD: That plans and specifications of the war needs of the government be procured to the fullest extent possible.

FOURTH: That industries be classified and assigned to the division of work best adapted to their equipment, location, experience and organization.

FIFTH: That standardization be sought.

SIXTH: That co-operation be established and maintained with the war department and the counsel of national defense to the end that the needs of the government may be determined, each industry assigned to its work in the consummation of the general plan and that there be established in each industry officers who understand their particular work and the exact manner of its execution and who will in turn educate their particular industry to promptly execute its function.

SEVENTH: All of which shall be carried out under the direction of and as an aid to the counsel of national defense, as created by act of congress, Aug. 24, 1916, and the director of industrial mobilization authorized by said act.

Another resolution suggested by a committee consisting of Myron T. Herrick, F. F. Prentiss and Andrew Squire, was adopted. This resolution enthusiastically endorsed the stand of President Wilson in severing relations with Germany and assured the President and congress of loyal backing for every measure for the defense of the country.

After an address by Bascom Little on universal military training, the club endorsed a program for universal training of the youth of the nation.

Preliminary preparations for handling the local work in connection with the annual convention of the American Foundrymen's Association at Boston, Sept. 24 to 29, were taken by the New England Foundrymen's Association at its February meeting held at the Exchange club, Boston, Wednesday evening, Feb. 14. The address of the evening was delivered by W. S. Quigley, president of the Quigley Furnace Co., New York, on the subject: "The Use of High Temperature Cement to Prolong the Life of Furnace Linings, Crucibles, Etc."

Lehigh Coke Co.

Purchased by Pittsburgh Concern, Ally of H. Koppers Co.

The Lehigh Coke Co., South Bethlehem, Pa., it is announced officially, has been purchased by the Pittsburgh By-Product Coke Co., Pittsburgh, which is allied with H. Koppers Co., that city. The Lehigh plant consists of four batteries of 106 Koppers' ovens each. The company will continue to furnish gas, coal and coke to the Bethlehem Steel Co., as heretofore, under a 20-year contract. The purchase of the Lehigh properties by the Pittsburgh By-Product Coke Co. is understood to mean that the German interest in the coke plant, said to be about 70 per cent and held by the Deutscher bank of Berlin, has been acquired by American capital. The Lehigh Coke Co. has a capital stock of $3,500,000 preferred and $4,000,000 common outstanding. Detailed announcement with reference to the operation of the plant has not been given out. It is understood that under the restrictions imposed by the Deutscher bank, the Lehigh company had been prevented from selling its by-products except to domestic users not engaged in the manufacture of war material.

T. W. Tutwiler, superintendent of the Tata Iron Works, Sakchi, India, has been appointed superintendent of the Lehigh works. Mr. Tutwiler is well known in the iron trade in America. He was connected with the blast furnace department of the Indiana Steel Co., Gary, Ind., previous to going to India.

French Steel Makers Rejoice

New York, Feb. 12.—A leading steel company has received from several French steelmakers who some months ago were in this country superintending the buying of munition material, a cablegram enthusiastically welcoming the possible advent of the United States as an ally of France in war. The message follows: "We knew that one day you would bite. We trusted you. We are happy to send to our old friends who will be our allies tomorrow, our most cordial feelings."

Many Acres

Of Iron Ore and Coal Lands Bought by a Virginia Company

Whitesburg, Ky.—Feb. 12.—The Virginia Iron, Coal & Coke Co. has just closed important deals on some 2,000 acres of valuable iron ore and coal properties in the Black and Cumberland mountain regions east of here a few miles from the Kentucky border line. While the consideration was not made public, it is known to be large, perhaps the largest ever paid for similar properties in either Kentucky or Virginia. According to an announcement, the company will extend operations onto the new purchase for the Imboden iron furnace which was recently "fired in" at Big Stone Gap, Va., the furnace having been idle for several years.

It is guaranteed a regular operation for several years, as important new additions to the property have been made lately—most of which were rich in iron ore properties, besides vastly rich in coal of the finest coking qualities. The coal will also be developed this year, short line branches of railroad to be extended onto the properties. All this development will mean employment for thousands of men and the building of at least two or three new towns—industrial centers of note. Another new coal land boundary was purchased several days ago by the Virginia Iron, Coal & Coke Co. in the Looney Creek and Callahan sections between Imboden and Stonega. This property is to be reached by a short line branch of the Interstate railroad.

In Eastern Kentucky, coal mining activity continues to increase at a rapid rate, a large number of new companies coming into the territory, while old operating companies are making extensions and increases. The Consolidation Coal Co., one of the largest coal operating concerns in the south, has just made an increase in its capital from $39,190,500 to $45,000,000 and announces improvements in its plant in the Elkhorn field of this (Letcher) county that will mean an outlay of several million dollars.

Among the new companies just organized to make coking coal development immediately surrounding Whitesburg, are:

The Acme By-Product Coal Co., with $100,000 capital, by J. W. Reedy and others, at Fleming, Ky. These people will develop the Bentley coal land tract on the main line of the Louisville & Nashville railroad. The initial work has been started.

At Kona Station, the Detroit-Elk Coal Co., with S. L. Bastin and others, of Lexington, at the head, has been organized with a large capital. It will begin Feb. 15 the development of the W. H. Potter coal tract immediately below Kona Station, and will start with a capacity of 1,000 to 1,200 tons daily.

The Letcher County Coal Corporation, organized with $700,000 capital, by Richmond people, L. F. Casey and others, will develop large tracts of coal lands immediately above this city on the L. & N.

At Chavies, Ky., the Congleton Coal Corporation has been organized by Lee V. Congleton, Loyd Congleton, E. E. Hogg and others, with a capital of $70,000, and the development of the Johnson coal land tract will be developed just out from Chavies. A short line branch of the L. & N. will be extended onto the property.

The East Tennessee Coal Co., at Glowmar, Ky., is doubling its output, having secured additional coal lands on Raccoon Creek.

The Cravena Coal Corporation is another new concern organized at Hazard, Ky., with Frank Horn and others as incorporators. The initial development work is billed to be launched Feb. 20. Several hundred men will be given work.

All this development will necessitate considerable railroad building for the next few months. The Louisville & Nashville is locating an important 10-mile branch up Clover Fork of Cumberland river. The Lexington & Eastern will build two or three short-line branches in order to reach new undeveloped coal properties. At present the Baltimore & Ohio is rushing the work of construction of the Beaver Creek branch terminating at Weeksbury, Ky., 26 miles. The new road, which will open extensive coal and iron territory, will be completed and in operation by April 1 as announced. The Baltimore & Ohio will build two important short-line branches out from its Shelby Creek branch operating between Shelby Station and Jenkins.

Altogether, there will be much railroad building in Eastern Kentucky during the year.

The Portage Iron & Wire Co., Akron, O., recently incorporated with $50,000 capital, has purchased a site on the Belt Line railroad. The consideration was approximately $15,000. J. A. Bachman is president and Andrew Wohlgennt, secretary and treasurer, of the new company.

The National Machinery Parts Co. was incorporated recently by Ernest Truman, Charles F. Hamel, John C. Zabel, Carl J. Christensen and Frank Moore, for $10,000. The company will open a shop in Toledo, O.

Manganese Ore

Production Last Year Shows Large Increase—Prices High

Preliminary estimates by D. F. Hewett, of the United States Geological Survey, department of the interior, show that the production of manganese ore in 1916 was about 27,000 tons, the greatest since 1888 and nearly three times that in 1915, which was 9,709 tons. The estimate does not include maganiferous iron ores that contain less than 40 per cent of manganese, but it is very probable that the production of ores of this class also was much greater than in 1915. This output has come largely from the seven states, and the order in production will probably prove to be as follows: California, Arkansas, Arizona, Georgia, Virginia, Utah, Colorado. This order is interesting, because this is the first year in which a western state remote from the steel-producing centers has contributed the largest amount of manganese ore. The activity among manganese mines in California is due largely to the market for ores provided by the Noble Electric Steel Co. at Heroult.

The prices paid for manganese ore adapted to the manufacture of ferromanganese rose from a maximum of $22.50 for 50 per cent ore in 1915 to $32.50 in March, 1916. Except for minor fluctuations, which depended on temporary variations in demand, prices were nearly constant until the last month of the year, when sales at prices as high as $39 for 50 per cent Indian ore were reported. There were rumors that a contract for the delivery of 200,000 tons of Brazilian ore during 1917 was placed at $23 per ton f. o. b. Brazilian port, from which the freight rate to Baltimore is $12 a ton.

Imports of manganese ore for the first 10 months of 1916 amounted to 495,299 tons, of which 401,177 tons came from Brazil. For the same period of 1915 Brazil supplied 181,258 tons out of the total of 192,286 tons. There is a prospect, therefore, that the imports for the entire year will prove to have been almost double those of 1915—320,778 tons.

The property of the Marine Boiler Works, of Toledo, has been purchased by the Toledo Shipbuilding Co. The Marine Boiler Works will continue the work on hand, which includes some orders from the Great Lakes Engineering Co., of Detroit, and some for the Toledo Shipbuilding Co. It will take about 15 months to complete the work when the business of the shipbuilding company will be handled exclusively. Charles Baker will be retained as manager of the boiler works and no other changes are contemplated.

Steel Foundry

Will Be Established in Milwaukee—Will Build New Plant.

Milwaukee, Wis., Feb. 12.—A new open-hearth foundry with a monthly capacity of 1,200 tons will be established by Frank E. McIntyre, now general superintendent of the National Steel Foundries, a part of the National Brake & Electric Co., Milwaukee, according to announcement made today. Mr. McIntyre has organized the Hercules Casting Co. with an authorized capital stock of $400,000, and will build a complete new plant, which is expected to be ready to start production on July 1. Ground will be broken early in March for the new plant, the exact location of which is not yet announced. The main foundry will be 70 x 500 feet in size, with a 60-foot side bay. The equipment will consist of two open-hearth furnaces of 20 to 25 tons capacity, to be served by a battery of five electric traveling cranes.

The capital stock of the Hercules company is divided into $275,000 of preferred and $125,000 of common shares of a par value of $10 each. Mr. McIntyre will be president and general manager; J. J. McGovern, vice president; E. B. Gennrich, secretary, and Francis E. McGovern, general counsel. Mr. McIntyre, before coming to Milwaukee, was associated with the Colorado Fuel & Iron Co., Pueblo, Colo., and the Tennessee Coal & Iron Co., Birmingham, Ala. He has been engaged in the steel foundry business for more than 30 years.

Tungsten Deposits

The notable tungsten deposits near Bishop, the principal town of Owens valley, California, are described in a report just issued by the United States geological survey, department of the interior. These deposits are mined in Deep Canyon, which traverses an isolated group of hills at the base of the Sierra Nevada. Similar groups of hills farther south in Owens valley are known by distinctive names, such as the Alabama hills, and the name Tungsten hills has been suggested for the group in which the principal tungsten deposits have been found. The hills reach an altitude of 6,000 feet, or about 1,500 feet above the floor of Owens valley, but they are dwarfed into insignificance by the mighty range behind them, which towers to 13,000 feet.

The deposits, although found in 1913, remained practically unknown until the spring of 1916, when their exploitation was energetically begun. By midsummer two mills, having a total daily capacity of 400 tons, had been completed and were in active operation.

The ore bodies that are now mined are from 20 to 60 feet wide and from 150 to 260 feet long. The ore carries from 1.5 to 2 per cent of tungsten trioxide. The area in which scheelite-bearing deposits have been found forms a belt about 20 miles long, but the prospecting now going on will doubtless extend the dimensions of the field.

The report, which is entitled "Tungsten Deposits of Northwestern Inyo County, Cal.," by Adolph Knopf, is issued as Bulletin 640-L and can be had free on application to the director, United States geological survey, Washington, D. C.

Foreign Trade

Will be Carried on by a New Industrial Corporation

Chicago, Feb. 12.—Formation of a $5,000,000 foreign industrial corporation to extend the commerce of the United States has resulted from the efforts of Chicago and New York capitalists. Arrangements were practically completed yesterday in New York and Chicago. The charter authorizes the company to conduct a general agency business throughout the world, to own and operate steam ships and railroads, to buy and sell foreign securities and real estate, to deal in foreign exchange and acquire concessions of any character including lands, oils and fisheries.

Chicago men interested in the Corporation are M. W. Tilden, vice president of the Drovers National Bank; Frank C. Batchelder, vice president of the Baltimore & Ohio railroad; Jefferson Livingston, owner of the T. A. Snyder Preserve Co., and Frank K. Bull, chairman of directors of the J. I. Case Threshing Machine Co.

Eastern capitalists interested in the project include William H. Barnhard, treasurer International Salt Co., New York; A. Mitchell Hall, vice president Liberty National Bank, New York; Charles F. Junod, of Kountze Bros., bankers, New York; Harry W. Ford, president Saxon Motor Car Corporation, Detroit; V. V. Lebedjeff, president Foreign Industrial Corporation, New York. The Pacific coast and the Orient will be represented by W. W. Chapin, former owner of the San Francisco Call and S. Nagai, president of Fukushima & Co., of Tokio.

The new corporation has been organized to take over and establish foreign sales agency and enlarge it by the building of a systematized sales force in the interests of American manufacturers.

Steel is Precious

And Almost as Hard to Get as Gold in England

Bureau of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Feb. 2, 1917.

The pressure for steel is so great that wherever iron can be substituted this metal is being taken. The metal is, in fact, becoming impossible to obtain. It is probably easier to obtain gold than steel at the present moment. The government has practically commandeered the whole of the output. But small lots of scrap, discards and billets found unsuitable for certain purposes can still be occasionally obtained, and the market for these are keen. Enormous volumes of steel business are permanently in suspense until after the war, and many steel-consuming factories devoted to Pacific production have had to shut down for the present. Wire happens to be a commodity which cannot be done without; but, for the most part, this is dependent upon supplies of American steel rods, selling at as much as £27 ($129.60) per ton at the ports. A number of the steel works are constantly extending their plants, but these enlargements take time, and the year is likely to be much older before many of these new plants contribute to an increased ouput.

The tin plate trade of South Wales is being further restricted owing to the transfer of the workers into steel works directly contributing to the war. Indeed, the authorities are seeking to take away every tin plate worker of military age. This is not an impossible achievement, because more than half the mills have been shut down, and there are probably enough older men to keep the remainder in operation. The stoppage of the tin plate mills, followed recently by a new order prohibiting the sales of tin plates and wasters, except for war purposes, has had a serious effect upon the Birmingham lamp trade and other industries utilizing this material. A number of interested users of tin plate from Birmingham, London, Liverpool and Swansea are arranging to interview the Minister of Munitions, with a view to some relaxation in the order.

Buys Plow Plant

The Seiss Mfg. Co., of Toledo, recently purchased the plant of the old Toledo Plow Co., located on Phillips avenue, and will remove there soon. The plant is being remodeled and the latest design in equipment is being installed. When the new building is ready, about 75 more people will be employed by the company.

Tool Builders Support Government

Many Concerns Give Pledge to Back President if Need Arises—Machinery Markets Refuse to Slump at News of Impending Crisis—Huge Requirements Continue to Appear in East

THE leading factor in the machine tool situation continues to be the international situation. Machine tool interests have a vivid recollection of the extent to which the government commandeered and supervised the operations at all kinds of manufacturing plants during the Spanish-American war. Due to the growth in the importance of manufacturing operations in connection with warfare as it is now conducted, the opinion prevails that the extent to which plants will be taken over by the government will be on a much larger scale than at the time of the Spanish-American war. At the same time, however, it is not considered likely that industries in this country for some time to come will be mobilized on the same scale as prevails in Europe. The machine tool builders consider it likely that their plants would not be among the first plants to be taken over since most of them now are engaged in the production of tools which are required in the making of munitions.

The first price advance on special railroad shop machine tools which had been made for some time, materialized last week in the form of a 10 per cent increase. The higher prices which now are quoted on railroad tools and the extent to which the market now is sold up, is causing some of the railroads to slow up their purchases. The most notable instance is in the case of the Chicago, Burlington & Quincy, which has decided to cut down its large list recently issued. The Union Pacific has placed a large amount of additional business and the Baltimore & Ohio and the Delaware, Lackawanna & Western have placed some good orders. Orders for single tools are being placed freely by the railroads throughout the country and the total of this business is considerably larger than it was two or three months ago.

Among the active buyers in the east is Hoagland-Thayer, Inc., 300 Washington street, Newark, N. J., which is about to undertake the manufacture of 1-ton electric trucks on a large scale. The company has issued inquiries for a large number of machine tools. The largest crane inquiry which has come out in a long time is embodied in the inquiry just issued by the Westinghouse Electric & Mfg. Co. This company is inquiring for some 50 cranes ranging up to 100 tons in capacity for installation in the huge new plant it is about to erect at Essington, Pa. The Morgan Engineering Co. has taken contracts for two 2½-ton charging machines to be installed in the copper refinery of the United States Smelting & Refining Co., at Chrome, N. J. This concern also, as reported last week, has taken two 25-ton, 60-foot span soaking pit cranes to be built for the Bethlehem Steel Co. The latter cranes, it is believed, are the largest soaking pit cranes ever contracted for. The Midvale Steel & Ordnance Co. is in the market for one 15-ton and one 10-ton cranes for installation in a new test house. The Interborough Rapid Transit Co., New York, is in the market for three or four 20-ton cranes. The Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, is in the market for a number of cranes. Huge requirements are expected to be inquired on in the near future by the American Bridge Co., which plans to build a large new plant on the Delaware river at Trenton, N. J. Due to the fact that the company is too well booked ahead with contracts to undertake the work of erection at the present time, active work on this undertaking has been postponed for a few months. A large tool list which appeared recently in the New York market is published on page 440.

Chicago Market Fluctuates

MACHINE tool dealers in the Chicago district find some unusual conditions. Usually November and January are dull months but November proved the best month of the year and January almost equaled it in the volume of new business closed. Some observers believe there has been a slackening in the past few days, but others find the strong demand continues unabated. There has been comparatively little export business under consideration. Growth of industrial concerns and formation of new companies continue and offer a field for placing much equipment. The Smith Motor Truck Co. is doubling its capacity at its plant at Clearing, Ill. Beall Bros. Tool Co., Alton, Ill., is making additions. The Ajax Frog & Switch Co., Blue Island, Ill., is about to build a plant at Superior, Wis., to care for its business in the northwest. The Great Northern railroad is planning to build a locomotive repair shop at Superior. The Alexson Machine Works, Los Angeles, Cal., is beginning work on an extensive new plant, including a machine shop, forge shop and foundry. The Capital Truck Co., Indianapolis, is about to build a plant. Machine shops are to be built by the Industrial Mfg. Co., Chicago, and the Walls Frogless Switch Co., Kansas City, Mo. The city of Algona, Ia., is to install a diesel oil engine and generator and the city of St. Louis, Mo., will buy a 1,000,000-gallon steam-driven turbine pump. The Kempsmith Mfg. Co., Milwaukee, plans to install a 200-kilowatt generator.

Heavy Inquiries for Pittsburgh Dealers

THE domestic market for machine tools continues to be very active in the Pittsburgh territory. Dealers have not yet been called upon to furnish equipment for the manufacture of munitions for the United States government, and it is too early to say how the trade will be affected by the break in diplomatic relations with Germany. Munition plants in this district have disposed of virtually all the machinery they bought some time ago for making 3 and 4-inch shells, selling most of this equipment to Canadian interests. Plants making 6 and 8-inch shells, however, have not dismantled any of their equipment. The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., which has completed plans for a $5,000,000 plant at Essington, Pa., will require approximately 200 machine tools, including 35 radial drills, a large number of lathes, planers, reamers and presses. The plant will be commanded by 50 electric cranes, having lifting capacities ranging from

The Steel of Reliability!

The first time we ever saw a Bascule Bridge, we doubted its ability to ***open***—but it opened.

We were not afraid, tho, that it could not ***close.*** What we did fear was that it would close with a bang, destroying itself and crushing everything beneath it.

But slowly, steadily it lowered, under perfect control always, despite the inconceivable strain on the teeth of rack and gears.

The rack and gears were made of ***reliable steel.***

AGATHON STEELS

WILL SERVE YOUR PURPOSES *BEST!*

WE MAKE

"AGATHON" Chrome Nickel — "AGATHON" Vanadium
"AGATHON" Chrome Vanadium — "AGATHON" Chrome Steel
"AGATHON" Nickel Steel — "AGATHON" High Carbon
"AGATHON" Special Analyses

AGATHON STEELS are specially prepared for ***reliability.***

They are unequaled for the making of ***Gears, Cams, Crank Shafts, Driving Shafts, Pistons, Rods, Axles, Springs,*** etc.

Whether you are building bridges, automobiles, locomotives, or anything else that puts your reputation at stake, use AGATHON STEELS.

ASK US FOR FULL DETAILS.

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MASSILLON, OHIO

BRANCH OFFICES:

Detroit Office: 326-27-28 Ford Bldg., F. Walter Gulbert, District Representative
Cleveland Office: Hickox Bldg., The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Bldg., 14 East Jackson Blvd., A. Schaeffer, District Representative
Philadelphia Office: 932 Widener Bldg., Frank Wallace, District Representative
J. E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents

5 tons to 100 tons. It may be several weeks before this machinery is purchased. The General Electric Co. has closed for eight cranes for a new foundry at Erie, Pa. The Aluminum Co. of America, the Colonial Steel Co. and the Phillips Sheet & Tin Plate Co. have figured in the market for single cranes the last few days.

Inquiries Come Into Cleveland Market

THE Cleveland machine tool market is unusually well supplied with inquiries for miscellaneous lots of equipment for concerns engaged in a variety of lines of manufacture. The absence of shell-making tools is noticeable but the lists which have appeared from several automobile builders in Cleveland have been heavy. Cleveland dealers have been actively figuring on the list which was sent out by the Kelly-Springfield Tire Co., Akron, and it has been stated by several local supply houses that some of the tools which are required by the rubber company cannot be delivered in less than 10 months and in some few cases, longer. Deliveries are slacking off again and quotations on certain size lathes have dropped behind considerably. Milling machines, drill presses and shapers find a ready market. The Torbensen Axle Co., 1115 East 152nd street, Cleveland, plans to build an extensive addition to its plant and has not completed its purchase of machine shop equipment which includes milling machines, shapers, screw machines, lathes and some heavy equipment.

Cincinnati Plants Busy

INQUIRY for machine tools during the past week has been better than at any time since the first of the year. The demand appears to be centered on lathes, milling machines and radial drills. Small electrical bench and portable drills and grinders are also finding a ready market. The American Valve & Tank Co., of Indianapolis, will build a foundry at Fairmont, W. Va., for which equipment will be needed. The Rahn-Larmon Co., Cincinnati, manufacturer of lathes, is considering moving its factory to Richmond, Ind., and if this is done, a small amount of machinery will be purchased. The Montpelier Mfg. Co., Montpelier, Ind., will double the capacity of its plant to take care of a recent order received from the Brown Hoisting Machinery Co., Cleveland. The McIntyre Mfg. Co., Columbus, O., will erect a factory, 100 x 200 feet. The Cincinnati Frog & Switch Co., Cincinnati, will build an addition, 60 x 120 feet. Equipment is being installed by F. A. Day & Co., which will open a factory for the manufacture of wooden heels for women's shoes, at Wade and John streets, Cincinnati.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

PORTSMOUTH, N. H.—D. H. McIntosh plans to build a brick and steel, 6-story, 64 x 100-foot business block at Congress and Fleet streets.

BOSTON.—Plans are being prepared for a brick and steel, fireproof, 12-story hotel of 1,000 rooms at Eliot and Tremont streets.

BOSTON.—Plans are being made for a municipal building to cost $250,000 at Shawmut avenue and Brookline street.

BOSTON.—Architect G. P. Falabella, 308 Harrison avenue, has completed plans for a 1-story, 38 x 46-foot auto repair shop for Fred J. Rockwell, 741 Washington street.

BOSTON.—The King Mfg. Co. has been incorporated to build autos, motors, supplies, etc., with $20,000 capital by Joseph F. King, Brookline, Mass., president and treasurer; A. G. King and C. R. Jeffers.

EAST CAMBRIDGE, MASS.—The Lechmere National bank is having plans drawn for a $50,000 building at Cambridge and Third streets.

FALL RIVER, MASS.—Willard M. Pettey will build a brick, mill construction, 3-story, 77 x 91-foot storehouse on Front street.

FALL RIVER, MASS.—William J. Dunn will build a brick, reinforced concrete, fireproof, 3-story, 100 x 300-foot public garage to cost $100,000.

HINGHAM, MASS.—The United States government will build a hollow tile and stucco, 1-story, 50 x 180-foot each, magazine building and shell house, to cost $43,200, at its naval headquarters.

HOLYOKE, MASS.—M. J. Horrigan, carriage manufacturer, 380 High street, has started work on the erection of a 2-story plant addition.

LOWELL, MASS. — The Lawrence Mfg. Co. will build a brick, 5-story, 96 x 100-foot storehouse to cost $40,000 on Perkins street.

LYNN, MASS.—General Electric Co. is about to start work on a 2-story, 41 x 83-foot manufacturing addition.

MAYNARD, MASS.—The town will build a brick, 2-story, 75 x 120-foot, 16-room grammar school to cost $55,000 on Nason street.

NEW BEDFORD, MASS.—The plant of the Taunton-New Bedford Copper Co., which was recently damaged by fire will be rebuilt at once.

NEW BEDFORD, MASS.—Hull & Cutler will build a brick, 2-story, 80 x 120-foot and a 1-story, 60 x 40-foot addition to their mill at Acushnet avenue and Pearl street.

NEW BEDFORD, MASS.—The city will build a Dennison tile and stucco, 1-story and basement, 140 x 200-foot primary and grammar school to cost $150,000 on Hathaway street.

NEWTON, MASS.—Plans are being figured for a brick or concrete, 1-story, 50 x 200-foot factory building for the Stone & Woodward Rubber Goods Co. on Oak street.

NORWOOD, MASS.—The town will build a brick, 3-story, 97 x 210-foot grammar and high school building, a 3-story, 88 x 92-foot auditorium, a 92 x 136-foot shop and boiler house and a coal pocket.

SPRINGFIELD, MASS.—Buchholz Sign Co. is about to erect a new 1-story plant.

WORCESTER, MASS.—The Standard Oil Co., of New York, has purchased 10,000 feet of land on Milbury street, and will erect a factory, warehouse and office building on the site in the spring.

NORTHFIELD, VT.—The Northfield University will build a brick, 3-story and basement, 77 x 128-foot building to be known as Commons Hall.

BRIDGEPORT, CONN. — Carlson Bros. have let the contract for a brick, 3-story, 49 x 107-foot factory building on Hurd avenue.

NEW HAVEN, CONN.—The Marlin Arms Corporation has taken over certain patent rights under which it will manufacture aerial torpedoes.

NEW HAVEN, CONN.—The Eastern Machinery Co. has awarded a contract for the erection of a 1-story, 90 x 200-foot plant addition.

WALLINGFORD, CONN.—Plans are being drawn for a new 1 and 4-story, 100 x 270-foot manufacturing addition to the plant of Wallace & Sons Mfg. Co. The new building will house the company's steel working department and will cost between $75,000 and $85,000. The company recently completed a machine building devoted exclusively to producing the special machines which are used in this plant.

THE WORLD'S UPSIDE DOWN

All kinds of Iron and Steel Rolls and Steel Castings.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

Rolling Mill Jim.—

So long—

Here's hoping you are fixed the same way.

from the Boss and it will be up to me to push the old mills a little harder. But I should worry as I've got Hubbard Rolls and Hubbard Equipment all the way through.

I'm all upset today as I just got word Uncle Sam has busted with Wilhelm. Now I'm afraid Uncle will want some tonnage

Upside Down Talks with

ROLLING MILL JIM

Along the Middle Atlantic Seaboard

NEW YORK.—The Dubilier Condenser Co. has been incorporated with $75,000 capital to build electrical machinery, by M. K. Morse, J. N. Essler and K. S. Neal, 111 Broadway.

NEW YORK.—The Metro Metal Mfg. Co. has been incorporated with $15,000 capital to manufacture metal goods and fasteners, by S. Oppenheim, J. Wildstein and M. H. Milman, 649 Linden avenue.

CAMDEN, N. J.—The Camden Boiler Works Co. has been incorporated with $10,000 capital by J. E. Boyle, F. W. Dyne and Henry Ladage.

DOVER, N. J.—Dover Boiler Works has let a contract for the erection of a 1-story, 75 x 80-foot boiler shop.

HOBOKEN, N. J.—The Knight Mfg. Co. has been incorporated to manufacture roofing materials with $50,000 capital, by Joseph Knight, Bulls Ferry, N. J.; F. Lange Jr., and Jacob Strauss, Hoboken.

IRVINGTON, N. J.—Lionel Mfg. Co., 48 East Twenty-first street, New York, has completed plans for the erection of a 2-story, 77 x 78-foot addition to its plant here.

JERSEY CITY, N. J.—Ornamental Art Metal Works, 61-63 Cornelison avenue, is about to let a contract for the erection of a 1-story, 40 x 50-foot plant addition.

KERNEY, N. J.—Thomas A. Edison, Inc., has taken title to about 10 acres here.

NEWARK, N. J.—Art Metal Works, 7 Mulberry street, is about to let a contract for the erection of a 4-story and basement, 36 x 44-foot plant addition.

NEWARK, N. J.—The F. H. Ogden Co., Union building, has completed plans for a 1-story, 60 x 100-foot manufacturing building to be leased for occupancy to the Willard Storage Battery Co.

NEWARK, N. J.—Architect E. F. Fickes, Oliver building, Pittsburgh, has completed plans for a 6-story and basement, 60 x 350-foot plant to be built here for the Aluminum Goods Mfg. Co., George Vitts, president, 699 Springfield avenue, Newark.

PERTH AMBOY, N. J.—Plans have been filed with the building inspector for a new $10,000 addition to the local plant of the Standard Underground Cable Co.

TRENTON, N. J.—The Wetzel Mechanical Stoker Co. has been incorporated with $200,000 capital to manufacture stokers and power plant equipment, by J. R. Barber and M. P. Schwartz.

ALLENTOWN, PA.—Bethlehem Motors Corporation contemplates the erection of an addition to its automobile plant.

BEAVER FALLS, PA.—The Union Drawn Steel Co. plans to erect a 2-story machine shop, 80 x 170 feet, to cost $25,000. J. A. Snyder, 917 Seventh avenue, is preparing the plans.

CORNWELLS, PA.—The Schutte & Koerting Co. has let a contract for the erection of a 1-story plant addition.

DU BOIS, PA.—The power house of the Buffalo & Susquehanna Coal Co. was damaged to the extent of $50,000 by an explosion recently.

DUBOIS, PA.—The board of education plans to erect a 2-story high school, 80 x 120 feet, to cost $70,000. Harrington & Howard are preparing the plans. J. Miller, Deposit Bank building, is president of the board.

DUNMORE, PA.—Perpetual Spark Plug Co., H. M. Spencer, owner, has completed plans for the erection of a 2-story, 30 x 186-foot addition.

EBENSBURG, PA.—The board of education plans to build a 2-story high school, 97 x 124 feet. W. R. Myton, 1204 First National Bank building, is preparing the plans. Oscar S. Kinkead, Ebensburg, is president of the board.

ERIE, PA.—The board of education plans to erect a 2-story grade school, to cost $200,000. W. B. Ittner, St. Louis, Mo., is preparing the plans. W. J. Flynn, Public Library building, is business manager of the board.

FRANKLIN, PA.—Venango county plans to construct a bridge over Tarkin Run, Cranberry township.

JOHNSTOWN, PA.—The city plans to construct a bridge to connect Napoleon and Carr streets.

JOHNSTOWN, PA.—The Haws Refractories Co. has been incorporated with $250,000 capital by Campbell Patch, H. D. Thomas and H. L. Tredennick.

JOHNSTOWN, PA.—The board of education plans to erect a high school, to cost $200,000. Henry Hornbostel, 40 Cedar street, New York, is preparing the plans. W. A. Cochran, 606 Central avenue, is president of the board.

MARS, PA.—The board of education plans to erect a 1-story and basement high school, 70 x 70 feet, to cost $25,000. W. G. Eckles, Lawrence Savings Trust Co. building, New Castle, Pa., is preparing the plans. Dr. J. H. Bakinger is president of the board.

NEW BRIGHTON, PA.—The board of education plans to erect a 3-story high school, 127 x 145 feet, to cost $100,000. W. G. Eckles, Lawrence Savings & Trust Co. building, New Castle, Pa., is preparing the plans. D. C. Schofield is secretary of the board.

NEW KENSINGTON, PA.—The American Enameling & Mfg. Co. has been incorporated with $10,000 capital by W. L. Hankey, Wilmerding; J. M. Kennedy, Parnassus, et al.

PHILADELPHIA.—Advance Machine Co., 911 Vine street, has let a contract for the erection of a plant extension.

PHILADELPHIA.—The Fidelity Automobile shops have been damaged by fire to the extent of $150,000.

PHILADELPHIA.—Hess-Bright Mfg. Co. is having plans drawn by Architects Watson & Huckel, 1211 Walnut street, for a 1- and 2-story, 80 x 218-foot plant addition.

PHILADELPHIA.—The William Adams Foundry Co., 960 North Main street, was damaged to the extent of $20,000 by fire recently.

PHILADELPHIA.—The Schwarz Wheel Co., Trenton avenue and Margaret street, has let a contract for the erection of a 1-story manufacturing addition 60 x 140 feet, with a 17 x 39-foot wing.

PHILADELPHIA.—Bids are being received on the construction of a 2-story, 46 x 198-foot addition to the artillery case shop and a 4-story, 30 x 63-foot addition to the instrument department at the Frankford arsenal.

PUNXSUTAWNEY, PA.—City plans to construct municipal waterworks, to cost about $400,000.

SHARPSBURG, PA.—The board of education plans to erect a 3-story high school, 54 x 100 feet, to cost about $100,000. C. C. and A. L. Thayer, Mercantile building, New Castle, Pa., is preparing the plans. Dr. R. D. Ambrose is secretary of the board.

ST. CLAIR, PA.—Eastern Pennsylvania Railways Co., O. H. Palmer, general manager, Pottsville, Pa., contemplates rebuilding its power plant, car barn and machine shop here.

TEMPLETON, PA.—The Harbison-Walker Refractories Co., Farmers Bank building, has awarded G. A. Cochrane, 1210 Washington avenue, Pittsburgh, a contract to erect a brick plant.

TYRONE, PA.—The board of education plans to erect a 2-story addition to a public school, to cost $14,000. Julian Millard, Hutchinson building, Altoona, is preparing the plans. R. A. Zantmyer is president of the board.

CLAYMONT, DEL.—Bids are being taken for the construction of a plate mill building and other completing sections of the new steel plant under construction for W. P. Worth and associates.

WILMINGTON, DEL.—Permits have been granted to the Pusey & Jones Co. for the erection of two large new machine shops. These will be 60 x 333 and 62 x 190 feet, respectively, and will be constructed of steel and concrete with a large part of the walls being given over to windows.

BALTIMORE.—Electric Zinc Co., J. F. Bruan, Sixteenth street and Second avenue, has preliminary plans for two 100 x 200-foot manufacturing buildings.

CUMBERLAND, MD.—A new plant for the Springfield Tire Co., embracing four or five buildings of the large size, is up for figures.

Another Tool List

John W. Thorne & Co., 14 Wall street, New York City, have issued an inquiry for the list of tools which appears below. Can you supply any of them?

Three Brown & Sharpe, or equivalent, size 13, gear cutters.
One Brown & Sharpe, or equivalent, size 1, universal grinder.
Eight Lucas, or equivalent, universal boring mills.
Two Cincinnati Bickford, or equivalent, 4-foot radial drills.
One Cincinnati Bickford, or equivalent, 2½-foot radial drill.
One 12 x 48-inch grinder.
Two 16-inch x 8-foot grinders.
Four Heald No. 70, or equivalent, grinders.
Five Heald No. 60, or equivalent, grinders.
Two Becker, or equivalent, milling machines, 39 x 12 inches.
Seven Colburn, or equivalent, D-4 drill presses.
Three Cincinnati, or equivalent, No. 3 millers.
Fifteen Becker, or equivalent, No. 7-H millers.
One Becker, or equivalent, style B vertical miller.
Two Becker, or equivalent, style 4B vertical millers.
One Landis, or equivalent, style 1½ or 2 universal grinder.

Blackwood STEELS

Our large, spacious shipping room, one corner of which is illustrated above, was designed to accommodate the immense capacity of our foundry. Speed, accuracy and quality—these watchwords are unchangeable with us. ***Ask us about our eight day delivery schedule.***

We specialize the making of

CASE HARDENING BOXES

and

LEAD and CYANIDE POTS

Made of specially prepared steel.

Also

Superfine Steel Castings

for

Automobiles, Auto Trucks and High Grade Machinery.

ELECTRIC CASTINGS

of the highest permeability,

and

CASTINGS made of special alloys.

WRITE US

The Blackwood Steel Foundry Co.

Springfield, Ohio

Activities in the Central States

BROOKLYN.—Thomas W. Kiley & Co. have been incorporated with $300,000, to manufacture hardware and metal articles, by W. A., R. J. and T. W. Kiley, Hancock street.

BROOKLYN, N. Y. — The American Can Co. has filed plans for a 6-story and basement, concrete factory, 200 x 690 feet, to occupy the entire block between Forty-third and Forty-fourth streets, on the West side of Second avenue.

BUFFALO. — The American Household Storage Co., 297 Niagara street, plans to erect a 4-story warehouse, 30 x 124 feet. G. M. Wolfe, Henkle building, is preparing the plans.

BUFFALO.—F. F. Dalley Co., 277 Military road, has let a contract for the addition of two stories to its present plant.

BUFFALO.—The New York Central railroad plans to erect a substation at Bond and Clinton streets. G. W. Kittredge, New York City, is chief engineer.

BUFFALO.—The Ferguson Steel & Iron Co., 1499 Bailey avenue, has awarded J. W. Cowper, Inc., Fidelity building, a contract to erect a fabricating shop, to cost $200,000.

BUFFALO.—The Central Star Laundry Co. plans to erect a power plant at 21 Northland avenue. R. J. Reidpath & Son, Builders' Exchange building, are preparing the plans.

CORTLAND, N. Y. — Brockway Motor Truck Co. has completed plans for the erection of a 1-story, 50 x 200-foot machine shop.

ELM PARK, N. Y., S. I. — Lincrusta Works "Pallas" Inc., 121 East Twenty-fourth street, New York City, has let a contract for the erection of two 2-story manufacturing buildings here.

GENEVA, N. Y.—The city plans to construct a filtration plant, to cost $40,000. J. W. Brennan, city hall, is the engineer in charge of the work.

HORNELL, N. Y.—The Economy Devices Corporation has been incorporated with $1,000,000 capital to manufacture equipment and accessories for ship builders and railroads by H. G. Wenzel Jr., F. R. Serles and A. R. Palmer, Madison, N. J.

IRVINGTON, N. Y. — The plant of the Riverside Metals Corporation was slightly damaged by an explosion Jan. 25.

ITHACA, N. Y.—The Thomas-Morse Air Craft Corporation has been incorporated with $400,000 capital, by J. A. Fried, W. T. Thomas and F. L. Morse.

JAMESTOWN, N. Y.—The Bank of Jamestown plans to erect a 6-story bank, 20 x 120 feet. Mowbray & Uffinger, 56 Liberty street, New York City, are preparing the plans.

LACKAWANNA, N. Y.—The Lackawanna Trust Co. and the Lackawanna National Bank plan to erect a 1-story bank building, 40 x 110 feet. N. Dunning, Builders' Exchange building, is preparing the plans.

ROCHESTER, N. Y. — The Kellogg Mfg. Co. has increased its capital from $25,000 to $75,000. The company plans to erect a 3-story factory, 50 x 100 feet.

ROCHESTER, N. Y.—R. T. French Co., Mustart street, plans to erect a 2-story warehouse, 69 x 197 feet, to cost $20,000. Foote, Headly & Carpenter, 405 Carter building, are preparing the plans.

ROCHESTER, N. Y.—The Central Presbyterian church plans to erect a 3-story edifice, 60 x 160 feet, on Plymouth avenue, to cost $70,000. Gorden & Madden and William G. Kaelber, 200 Sibley Block are preparing the plans.

SCHENECTADY, N. Y.—General Electric Co. has completed plans for a 1 and 2-story, 125 x 525-foot foundry.

SOLVAY, N. Y.—Architects Russell & King, Syracuse, N. Y., have completed plans for a 3-story and basement, 60 x 180-foot manufacturing building for Pass & Seymour, Solvay.

SYRACUSE, N. Y. — Keith-Albee, 1564 Broadway, New York City, plan to erect a theater and office building, 72 x 208 feet, to cost $500,000. Thomas W. Lamb, 644 Eighth avenue, New York City, and Albert E. Westover, Keith's Theater building, Philadelphia, are preparing the plans.

UTICA, N. Y. — William Martin, 225 Bleecker street, plans to erect a 6-story hotel, to cost $80,000. The Barnett Architectural Co., Central National Bank building, St. Louis, Mo., is preparing the plans.

UTICA, N. Y.—The Y. W. C. A. plans to erect a 3-story building, to cost $30,000. Linn Kinne, Mayro building, is preparing the plans. Miss H. A. Ackroyd, 205 Mayro building, is secretary of the association.

WATERBURY, N. Y.—Chase Metal Works

Bits of News from Here and There

The Kales Stamping Co., Detroit, formerly the Kales-Hasket Co., announces a change in the firm name. There has been no change in the personnel or the products of the company.

* * *

The F. M. Emerson Co., Milwaukee, structural and steel engineer and contractor, has moved into its new shop and office building at 439 Atwater road, East Milwaukee. The company was formerly located at 82 Wisconsin street.

* * *

The Jos. D. McCord Co., Milwaukee, has been organized with $15,000 capital as agent, representing the American Steel Window Co. and other manufacturers of metal building materials. The new concern will be located at 610 Majestic building.

* * *

The Matthew-Addy Co., Cincinnati, pig iron and coke dealer has increased its capital from $180,000 to $200,000 to extend its operation.

* * *

The Tenacity Mfg. Co., Reading, O., has decreased its capital from $150,000 to $90,000. The company makes loose leaf filing devices and uses large quantities of steel sheets.

* * *

The Brazil Motors Co., Brazil, Ind., recently incorporated with $150,000 capital, has purchased the plant of the Brazil Fence Co. and will manufacture front-drive motor trucks.

* * *

The H. B. Smith Machine Co., Smithville, N. J., announces the election of the following officers: President, E. A. Smith; vice president, W. S. Kelley and W. A. Whiting; secretary-treasurer, T. R. Finley; general manager, E. R. Smith, and sales manager, G. A. Lippincott.

* * *

The Stone & Webster Engineering Co., Boston, has started factory buildings for the Westinghouse Lamp Co., Trenton, N. J. The new plant will cost about $850,000 and is designed for a daily output of 70,000 incandescent lamps.

* * *

The Ford Motor Co. announces through its attorney, W. B. Crisp, that it will not build the proposed manufacturing plant along the Passaic river, Jersey City, N. J., so long as the state demands $50 a foot for riparian rights for 300 feet of water front. The company plans to hold a conference on the proposition with the state department of commerce and navigation.

* * *

Oscar J. Bamberger & Co., Philadelphia, representing the Central Machine Co., have leased to B. Feifer & Co. the second floor of the new concrete building at Seventh and Wood streets.

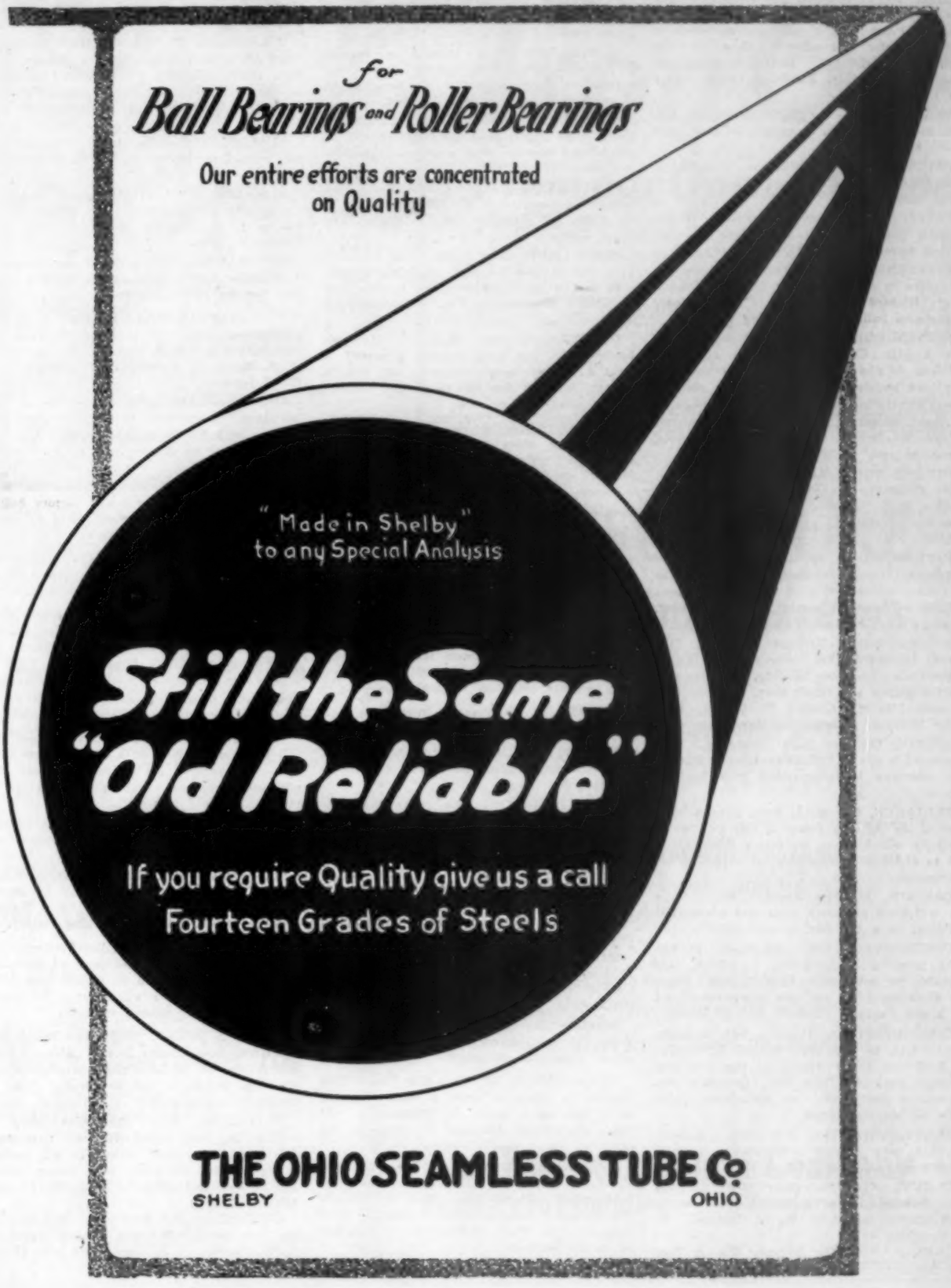
* * *

The plant of the Trenton Specialty Co., Trenton, N. J., owned by Duncan Macphee, Fieldsboro, N. J., has been purchased by Dennis & Watson of Trenton and will hereafter be operated as a machine shop.

* * *

The Modern Tool Co., Erie, Pa., manufacturer of grinding and threading tools, announces that its district office in Detroit has been removed to 1223 Dime Bank building. As heretofore this office will be in charge of H. T. White.

"OHIO SPECIAL"
Cold Drawn Seamless Steel Tubing


for
Ball Bearings and Roller Bearings
Our entire efforts are concentrated on Quality
"Made in Shelby" to any Special Analysis
Still the Same "Old Reliable"
If you require Quality give us a call
Fourteen Grades of Steels
THE OHIO SEAMLESS TUBE Co
SHELBY
OHIO

Say you saw it in THE IRON TRADE REVIEW

is about to start work on the erection of a 1-story, 120 x 660-foot plant addition.

WEST NYACK, N. Y. — The Quasi-Arc Weltrode Co. has been incorporated with $150,000 capital, to manufacture electrodes, by W. Moffatt, D. C. Alexander and F. W. Gorden, 61 Broadway, New York.

EAST PITTSBURGH, PA.—N. A. Planos has awarded Golden & Crick, 3512 Fifth avenue, Pittsburgh, a contract to erect a 3-story theater and office building, 38 x 120 feet, to cost $60,000. Harry S. Blair, 78 Vandergrift building, Pittsburgh, is preparing the plans.

PITTSBURGH.—The National Biscuit Co. will erect a 7-story, fireproof building, 200 x 300 feet.

PITTSBURGH.—The Shanhan Transfer & Storage Co. plans to erect a 10-story, fireproof building.

PITTSBURGH.—The Autocar Co., Philadelphia, plans to erect a building at 1830 Forbes street, to cost $75,000.

PITTSBURGH.—The Duquesne Reduction Co. plans to erect a 1-story foundry, 50 x 100 feet. Richard Benswanger, tenth floor, Rosenbaum building, is preparing the plans.

PITTSBURGH.—The Westinghouse Electric & Mfg. Co. plans to erect a 4-story building, 84 x 96 feet. Prack & Perrine, 801 Keystone building, are preparing the plans.

PITTSBURGH.—The E. & O. Brewing Co. has awarded H. A. Bloedel, 610 Arlington avenue, a contract to erect a 3-story stock house, to cost $25,000.

PITTSBURGH.—The Mayer Wagon Co., 6461 Frankstown avenue, has awarded the Walker & Curley Co., Bessemer building, a contract for erecting a wagon works, to cost $12,000.

PITTSBURGH.—The Oliver Mission, of Shadyside United Presbyterian church plans to erect a mission, 49 x 60 feet, to cost about $20,000. Thomas Hannah, Keenan building, is preparing the plans.

PITTSBURGH. — Bertram G. Case, 3753 Grant boulevard, has awarded the Fetzer Winger Co., Bessemer building, a contract to erect a garage and repair shop, 50 x 59 feet, to cost $11,000. Charles D. Geisler, Hostetter building, is preparing the plans.

AKRON, O.—The India Rubber Co. has purchased a site and plans to erect a factory. The company is incorporated with $125,000 capital.

ALLIANCE, O.—W. J. Rose, general manager of the Alliance Power & Gas Co., states company will increase its capital from $550,000 to $1,550,000, to provide for extensive improvements.

CANTON, O.—The Bowman Bros. Drug Co. will erect a 3-story plant and commercial building, 50 x 125 feet, to cost $30,000.

CINCINNATI. — The municipal electric light plant at Madisonville, a suburb, will probably be sold in the near future. Plans for disposing of it are now being considered by Mayor Pucta.

CINCINNATI.—A 10-story loft building, 66 x 99 feet, to cost $125,000, will be erected at Fifth and Home streets, by the Provident Savings Bank & Trust Co. Structural requirements not known, as preliminary plans have not been completed.

CLEVELAND.—The Cleveland Railway Co. has been granted a permit to erect a $60,000 substation on Ashland road.

CLEVELAND.—The Geier Mfg. Co. has been incorporated to make electrical devices with $25,000 capital by R. W. Edwards, W. J. Coughlin, et al.

CLEVELAND.—The Advance Mfg. & Tool Co. has been incorporated with $20,000 capital by B. E. John, C. H. Bell, M. M. Feidmer, et al.

CLEVELAND.—The City Ice Delivery Co. has been granted a permit to erect a $60,000 ice-making and storage plant on East Ninety-third street.

CLEVELAND.—The Empire Brass Mfg. Co. has been granted a permit to erect a $10,000 brick and steel foundry at 10301 Berea road.

CLEVELAND. — The Parsons & Parsons Co., East Seventy-sixth street near Cedar avenue, is planning factory additions to be of reinforced concrete, 46 x 123 feet.

CLEVELAND.—Clifford Bros., 2116 West Forty-fourth street, have purchased a site on which they plan to erect a charcoal plant to cost about $10,000.

CLEVELAND.—The Star Plating Co. has been incorporated with $10,000 capital by A. H. Cohn, M. Goldstein, M. E. Meisel and W. I. Lewis.

CLEVELAND.—The Briggs Mfg. Co., 2815 Taft avenue, has awarded the general contract for its plant improvements to the Hunkin-Conkey Construction Co., Cuyahoga building.

CLEVELAND.—The National Malleable Castings Co. has been granted a permit to erect a $40,000 factory building, the first of a group totaling $300,000 in cost, at Quincy avenue and Woodhill road.

CLEVELAND.—The W. S. Ferguson Co. is preparing plans for a $50,000, 2-story, brick and mill-construction building to be erected at Seventeenth street and Euclid avenue.

COLUMBUS, O.—Bids are being taken for an addition to the municipal electric light plant to cost $265,000. Contracts for equipment will be let soon.

EAST LIVERPOOL, O.—The National Drawn Steel Co. plans to erect a plant, 80 x 200 feet, to cost $30,000. R. Burgher is general manager of the company.

ELYRIA, O.—The Trexel Mfg. Co. has increased its capital to $1,000,000 and plans to erect a large plant on Washington avenue.

LORAIN, O.—Brenbunfers Engineering Co., munition maker, plans to extend its plant.

LORAIN, O.—The Lorain County Electric Co. is preparing plans for a 100 x 200-foot, $50,000 power house.

MANSFIELD, O. — The North American Brick & Clay Products Co. has been incorporated with $300,000 capital, by S. J. Colwell, W. W. Sharp, H. K. Beck, J. B. Lindley and J. H. Craig.

MARION, O.—The Marion Glass Mfg. Co. has been incorporated with $50,000 capital by G. L. Kraatz, C. B. Huntress, D. H. Lincoln, et al.

MINERAL RIDGE, O.—The Ohio Steel Products Co. plans a large addition to its present plant. The concern manufactures steel tubing.

NORWOOD, O.—The Norwood Sash & Door Co. will remodel its power plant and install additional equipment.

CHARLESTON, W. VA.—The Capitol City Supply Co. plans to erect a 2-story garage, 60 x 146 feet. James L. Montgomery, 404 Coyle Richardson building, is preparing the plans.

FAIRMONT, W. VA. — The American Valve & Tank Co., Indianapolis, has been incorporated with a capital stock of $250,000. The company plans to erect a plant at Fairmont. C. A. Wolf, Indianapolis, is interested in the company.

FAIRMOUNT, W. VA.—The Monongahela Powder Co. plans to erect a powder plant near Fairmount.

HUNTINGTON, W. VA.—John S. Farr plans to erect a 7-story hotel, 70 x 120 feet, to cost $100,000. Meanor & Sweeney, R. & P. building, are preparing the plans.

PARKSBURG, W. VA.—The Imperial Ice Cream Co. plans to erect a plant, to cost $50,000.

WHEELING, W. VA.—A stock company plans to erect a 2-story motion picture theater, store and office building, 64 x 130 feet, to cost $100,000. C. D. McCarty, National Exchange Bank building, is preparing the plans.

AUBURN, IND.—The Auburn Foundry Co. will rebuild its burned plant. B. A. Fink is president.

ELKHART, IND.—The Concord Foundry Co. has been incorporated with $50,000 capital by J. G. Schacht, S. E. Schacht, and Earnest A. Skinner.

FT. WAYNE, IND.—The Brass Foundry & Machine Co. is planning to build a gray iron foundry 150 x 250 feet.

INDIANAPOLIS.—The Esterline & Angus Engineering Co. has been incorporated to manufacture machinery with $10,000 capital by Q. A. Myers, E. E. Gates, E. F. McCoy and H. B. Johnson.

INDIANAPOLIS.—The Capitol Truck Co. has been incorporated to build trucks and tractors with $10,000 capital by Paul W. McElroy, Arthur O. Stanley and C. A. Edmonson.

MADISON, IND.—Osborn Paper Co. will need new equipment for a new factory building, three stories and basement, 88 x 270 feet. Preliminary plans are in progress.

MISHAWAKA, IND. — The Mishawaka Brass Foundry plans to install a new furnace. Other new equipment will be purchased.

RICHMOND, IND.—The Richmond Malleable Casting Co. has been incorporated with $100,000 capital by W. J. Blackmore, G. B. Calveage, and H. R. Lontz.

SOUTH BEND, IND. — The Studebaker Corporation of America is taking bids on a number of important extensions to its plant.

WABASH, IND.—The Cardinal Cabinet Co. will build an addition 80 x 90 feet, four stories and basement, for which equipment has not been purchased. Preliminary plans are in progress.

GREEN BAY, WIS. — The plant of the O'Leary Bros. Boiler Shop was damaged seriously by fire recently.

LACROSSE, WIS.—The Segelke & Kohlhouse Co. is having plans prepared by Architects Parkinson & Dockendorff for a 3-story brick, 65 x 170-foot, woodworking factory.

MILWAUKEE. — The Allen-Bradley Co., 495 Clinton street, manufacturer of electrical apparatus, has increased its capital from $25,000 to $136,000 and will enlarge its plant. H. L. Bradley is general manager.

STEVENS POINT, WIS.—The Bukolt Tire Protector Co. is being formed with $200,000 capital and will equip a plant to manufacture steel tile protectors and tire tools. John J. Bukholt is president.

SUPERIOR, WIS.—The Ajax Frog & Switch Co., Blue Island, Ill., will start work shortly on its branch plant. It will include a main shop, 200 x 240 feet, power house, 35 x 35 feet, and office building, 24 x 60 feet, costing $100,000.

DETROIT. — The Enterprise Foundry Co. has been incorporated with $30,000 capital by C. W. Carolin, G. S. Cuddy and John Goschenhofer.

Complete Analysis

	Dried 212°	Natural
Iron	58.35	50.2451
Phosphorus	.065	.05597
Silica	6.03	5.1924
Manganese	1.00	.8611
Alumina	3.40	2.9277
Lime	.16	.1377
Magnesia	.12	.1033
Sulphur	.031	.0266
Volatile Matter	5.74	4.9427
Moisture	13.89	

GUARANTEE for 1917

Iron, Natural 51.50

Iron Ore

From our Open Pit Mines

Physical Structure Coarse

High in Manganese

Very desirable for making Basic Iron

CRAWFORD ORE

Mesaba Non-Bessemer

Experienced furnace managers generally know how to keep out of trouble.

That is why you will find that most of them insist upon using our Crawford Ore.

The coarse structure of Crawford Ore insures its working well in the furnace mixture.

The Tod-Stambaugh Company

Perry-Payne Building Cleveland, Ohio

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

Bessemer valley	$35.00
Bessemer, Pittsburgh	35.00 to 36.00
Basic, Pittsburgh	30.95
Basic, eastern Pa.	30.50 to 31.00
Basic, Buffalo	35.00
Malleable, Pittsburgh	33.95 to 35.95
Malleable foundry, Chicago	31.00
Malleable foundry, Philadelphia	34.00 to 35.00
Malleable foundry, Buffalo	35.00
No. 1X foundry, Philadelphia	32.00 to 32.50
No. 2 foundry, Pittsburgh	33.95 to 35.95
No. 2 foundry, Cleveland	30.30 to 31.30
No. 2 foundry, Ironton	31.00
No. 2 foundry, Chicago	31.00
No. 2X foundry, Philadelphia	31.00 to 32.00
No. 2X foundry, N. J. tidewater	31.00 to 32.00
No. 2X foundry, Buffalo	35.00
No. 2 plain, Philadelphia	30.50 to 31.00
No. 2 plain, N. J. tidewater	30.30 to 31.00
No. 2 plain, Buffalo	35.00
No. 2 southern, Birmingham	23.00 to 25.00
No. 2 southern, Cincinnati	25.90 to 27.90
No. 2 southern, Chicago	27.50 to 28.00
No. 2 southern, Phila. delivery	28.00 to 30.00
No. 2 southern, Cleveland	27.50 to 29.00
No. 2 southern, New York docks	28.25 to 30.25
No. 2 southern, Boston docks	28.00 to 30.00
No. 2 south. interior, New Eng.	29.00 to 31.00
No. 2 southern, St. Louis	
Virginia, No. 2X furnace	28.00 to 29.00
Virginia, No. 2X, Philadelphia	30.75 to 31.75
Virginia, No. 2X, Jersey City	31.00 to 32.00
Virginia, 2X, Boston points	31.25 to 32.25
Gray forge, eastern Pa.	29.50 to 30.00
Gray forge, Pittsburgh	30.95
Gray forge Birmingham	22.00
Silveries, 8 per cent, furnace	36.00 to 37.00
Silveries, 8 per cent, Chicago	38.50
Low phos. Standard, Phila.	58.00 to 60.00
Low phos. Lebanon, Pa., furnace	55.00
Low phos., Pittsburgh	52.00 to 54.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	33.75 to 34.75
Charcoal, Buffalo	24.00 to 27.00
Charcoal, Birmingham	26.00 to 27.00

IRON ORE

Lake Superior Ores.	Lower Lake Ports.
Old range Bessemer, 55 per cent, ton	5.95
Messabi Bessemer, 55 per cent, ton	5.70
Old range non-Bes., 51½ per cent, ton	5.20
Mesabi non-Bess., 51½ per cent, ton	5.05

Port Henry Ores. Per unit delivered eastern Pa. All non-Bessemer.

Old Bed, crude, 58 per cent	10.50c to 11.00c
Old Bed, concent., 63 per cent.	11.00c to 11.50c
Harmony concent., 63 per cent.	11.50c to 11.75c
Lump (at mines)	$5.75

COKE

(At the ovens.)

Connellsville furnace	$8.75 to 9.50
Connellsville furnace, contract	8.00 to 8.25
Connellsville foundry, contract	6.50 to 6.75
Connellsville foundry	10.00 to 11.00
Wise county furnace, contract	8.00 to 9.00
Wise county foundry, contract	8.50 to 10.00
Pocahontas foundry, contract	8.50 to 10.00
Pocahontas furnace, contract	8.00 to 9.00
New River foundry, contract	9.00 to 11.00
New River furnace, contract	9.00 to 10.00

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, delivered prompt	$250 to 275
Ferro manganese, 80 per cent, delivered, contract	200 to 235
Spiegel, 20 per cent, fur. early and last half	65.00 to 70.00
Ferro-silicon, 50 per cent, Pbgh.	150 to 175

Bessemer ferro-silicon, 9 per cent to 10 per cent, $41.00; 10 to 11 per cent, $42.00; 11 to 12 per cent, $43.00; 12 to 13 per cent, $44.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$60.00 to 65.00
Forging billets, Phila.	75.00 to 85.00
Forging billets, Pbgh., nominal	75.00 to 85.00
Forging billets, Chicago	70.00
Wire rods, Pittsburgh	75.00 to 80.00
Bessemer billets, Youngstown	65.00
Bessemer billets, Pittsburgh	60.00 to 65.00
Open hearth billets, Pittsburgh	60.00 to 65.00
Open hearth billets, Youngstown	65.00
Bess. sheet bars, Youngstown	65.00
Op. h'th sheet bars, Youngstown	65.00
Bess. sheet bars, Pittsburgh	60.00 to 65.00
Open hearth sheet bars, Pbgh.	60.00 to 65.00
Muck bars, Pittsburgh (nominal)	50.00
Grooved steel skelp	3.00c to 3.10c
Sheared steel skelp	3.50c to 3.60c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bes. rails, Pbgh. & Chgo.	$38.00
Stan. op-h'th rails, Pbgh. & Chgo.	40.00
Light rails, 8 to 10 lbs., Pbgh.	53.00
Light rails, 8 lb., Chicago	50.00
Light rails, 12 to 14 lbs., Pbgh.	52.00
Light rails, 12 lbs., Chicago	49.00
Light rails, 16 to 20 lbs., Pbgh.	51.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—

Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to: —	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (all rail)	6.15
New York (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54
Duluth, Minn., to:—	
Minneapolis-St. Paul	$1.25
Mayville, Wis.:—	
Minneapolis-St. Paul	$1.75

Light rails, 16 to 20 lbs., Chgo.	$48.00
Light rails, 25 to 45 lbs., Pbgh.	50.00
Light rails, 25 to 45 lbs., Chgo.	47.00
Relaying rails, standard, Pbgh. and Chicago	$33.00 to 34.00
Relaying rails light, Chicago	34.00 to 35.00
Angle bars, st. sect., Pbgh. base	2.25c to 2.75c
Angle bars st. sections, Chgo.	2.25c to 2.75c
Spikes, railroad, Pittsburgh	3.40c
Spikes, railroad, Chicago	3.50c
Track bolts, Pittsburgh	4.50c to 5.00c
Track bolts, Chicago	4.50c to 4.60c
Tie plates, Chicago	$55.00 to 60.00

SHAPES, PLATES AND BARS

Structural shapes, con. Pbgh.	3.25c
Structural shapes, Philadelphia	3.409c to 3.659c
Structural shapes, New York	3.419c to 3.669c
Structural shapes, Chicago	3.44c to 4.00c
Tank plates, Chicago	3.94c to 4.50c
Tank plates, Pittsburgh (con.)	3.75c to 4.00c
Tank plates, Philadelphia	3.909c to 4.909c
Tank plates, New York	3.919c to 4.919c
Bars, soft steel, Chicago	3.19c to 3.50c
Bars, soft steel, Pbgh. (con.)	3.00c
Bars, soft steel, Pittsburgh	3.00c to 3.25c
Bars, soft steel, New York	3.169c to 3.419c
Bars, soft steel, Philadelphia	3.159c to 3.409c
Hoops, carloads, Pbgh. contr.	3.50c
Hoops, Pbgh.	4.00c to 4.25c
Bands, Pittsburgh	3.90c to 4.10c
Bands, Pittsburgh (contr.)	3.00c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chicago	3.00c
Bar iron, Philadelphia	3.159c
Bar iron, Cleveland	3.00c
Bar iron, New York	3.169c
Bar iron, Pittsburgh	3.25c
Hard steel bars, Chicago	3.00c

SHEETS

(In cents per pound.)

(Open hearth material takes 10c above prices of bessemer.)

SHEET MILL BLACK.

Gage.	Bessemer.
17 to 21	4.30 to 5.30
22 to 24	4.35 to 5.35
25 and 26	4.40 to 5.40
27	4.45 to 5.45
28	4.50 to 5.50
29	4.55 to 5.55
30	4.65 to 5.65

TIN MILL BLACK.

Gage.	Bessemer.
15 and 16	4.30 to 5.30
17 to 21	4.35 to 5.35
22 to 24	4.40 to 5.40
25 to 27	4.45 to 5.45
28	4.50 to 5.50
29 and 30	4.55 to 5.55
30½ and 31	4.60 to 5.60

GALVANIZED.

Gage.	Bessemer.
10 and 11	5.50 to 6.25
12 to 14	5.60 to 6.35
15 and 16	5.75 to 6.50
17 to 21	5.90 to 6.65
22 to 24	6.05 to 6.80
25 and 26	6.20 to 6.95
27	6.35 to 7.10
28	6.50 to 7.25
29	6.70 to 7.45
30	6.90 to 7.65

BLUE ANNEALED.

Gage.	Bessemer.
3 to 8	4.25 to 4.75
9 to 10	4.25 to 4.75
11 to 12	4.25 to 4.75
13 and 14	4.25 to 4.75
15 and 16	4.25 to 4.75

No. 28 black, Chicago	4.94c to 5.19c
No. 28 galvanized, Chicago	6.50c to 6.75c
No. 10 blue annealed, Phila.	4.659c to 5.159c
No. 10 blue annealed, Chicago	4.69c to 4.94c

TIN PLATE

Tin plate, 100 lb., coke base	7.00c to 8.00c
Terne plate	5.75c

IRON AND STEEL PIPE

(Prices adopted Dec. 30, 1916.)

Steel. Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
⅛, ¼ and ⅜, butt	57	30½
½, butt	61	46½
¾ to 3, butt	64	50½
2, lap	57	44½
2½ to 6, lap	60	47½
7 to 12, lap	57	43½
13 and 14, lap	47½	....
15, lap	45	....

Iron. Standard weight, threads and couplings, diam. in inches.	Black. Per cent off.	Galv. Per cent off.
⅛ and ¼, butt	46	19
⅜, butt	47	20
½, butt	51	33
¾ to 1½, butt	54	38
1¼, lap	40	25
1½, lap	46	32
2, lap	47	33
2½ to 6, lap	49	36
7 to 12, lap	48	35

BOILER TUBES

(Price adopted Nov. 20, 1916.)

Steel, 3½ to 4½ inches l. c. l.	46
Iron, 3½ to 4½ inches l. c. l.	36

IRON AND STEEL PRICES

Corrected up to Tuesday noon

WIRE PRODUCTS

(Adopted Nov. 24, 1916.)
(Retailers' prices 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$3.00
Coated nails	3.00 to 3.15
Plain wire, jobbers', Pittsburgh	2.95
Galvanized wire, jobbers', Pbgh	3.65
Polished staples, Pbgh	3.15
Galvanized staples, Pbgh	3.85
Barb wire, painted, jobbers', Pbgh.	3.15
Barb wire, galv., jobbers', Pbgh.	3.85

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 40 and 10; cut threads, 40 and 2½, larger or longer, 30 and 5.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 50; cut, 40 and 10; larger or longer, 35 and 5.

Cold pressed, semi-finished hexagon nuts, 50, 10 and 5.

Gimlet and cone point lag bolts, 50. Hot pressed square nuts, blanks, $2.50 off; tapped $2.30 off. Hot pressed hexagon nuts, blank, $2.50 off; tapped, $2.30 off.

Cold pressed square nuts, blank, $2.10 off; tapped, $1.90 off. Cold pressed hexagon nut, blank, $2.25 off; tapped, $2.00 off.

RIVETS

Structural rivets, Pbgh	4.25c
Boiler rivets, Pbgh	4.35c
Tinner's rivets, 40 and 10 off, Pittsburgh.	

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	3.00c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	6.00c

COLD ROLLED STRIP STEEL

Base price, 7.00c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

CAST IRON WATER PIPE

Four-inch, Chicago	$44.50 to 45.50
Six-inch and larger, Chicago	41.50 to 42.50
Six-inch Class B, New York	41.50
Four-inch Class B, New York	44.50
Four to six-inch Birmingham	39.00
Six-inch and larger, Birmingham	36.00

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.75c
Steel squares, 2-in. & ov., Cleve.	4.50c
Steel bars, und. 2 in., Cleveland	4.00c
Steel rounds, 2-in. & ov., Cleve.	4.50c
Steel bars, Detroit	3.70c
Steel bars, Philadelphia	4.00c
Steel bars, New York	4.00c
Steel bars, St. Louis	3.80c
Steel bars, Cincinnati	3.90c to 4.45c
Steel bars, St. Paul	3.85c
Steel bars, over 2-in., Buffalo	4.50c
Steel bars, Buffalo	3.85c
Iron bars, Chicago	3.75c
Iron bars, Cleveland	3.95c
Iron bars, Detroit	3.70c
Iron bars, St. Louis	3.75c
Iron bars, Cincinnati	3.80c to 4.35c
Iron bars, Philadelphia	3.75c to 3.85c
Iron bars, New York	3.75c to 3.85c
Shapes, Chicago	4.00c
Shapes, Detroit	3.90c
Shapes, St. Louis	4.05c
Shapes, St. Paul	4.10c
Shapes, New York	4.10c
Shapes, Cleveland	4.10c
Shapes, Philadelphia	4.10c
Shapes, Buffalo	3.95c
Shapes and plates, Cincinnati	4.10c to 4.75c
Plates, Chicago	4.65c
Plates, Detroit	4.75c
Plates, St. Louis	4.70c
Plates, St. Paul	4.75c
Plates, New York	5.15c
Plates, Cleveland	4.75c
Plates, Philadelphia	5.25c
No. 10 blue anl. sheets, Chicago	5.00c
No. 10 blue anl. sheets, Clevel'd	5.00c
No. 10 blue anl. sheets, Buffalo.	4.50c
No. 10 blue anl. sheets, St. L..	5.05c
No. 10 blue anl. sheets, Cinci..	5.00c
No. 10 blue anl. sheets, St. Paul	5.10c
No. 10 blue anl. sheets, Detroit.	4.75c
No. 28 black sheets, Chicago	5.15c
No. 28 black sheets, Cleveland..	5.50c
No. 28 black sheets, Cincinnati.	5.25c
No. 28 black sheets, Detroit	5.25c
Hoops, Detroit	4.50c
No. 28 black sheets, St. Louis..	5.30c
No. 28 black sheets, St. Paul	5.25c
No. 28 galv. sheets, Chicago	7.00c
No. 28 galv. sheets, Cleveland	7.00c
No. 28 galv. sheets, Cincinnati	7.50c
No. 28 galv. sheets, Detroit	7.25c
No. 28 galv. sheets, St. Louis	7.50c
Hoops, Cleveland	5.00c

Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.75 to 2.00
Solvent naphtha	.25

Per Pound at Producers Plant.

Phenol	$0.48 to .50

Per 100 Pounds at Seaboard.

Sulphate of ammonia	$4.25 to 4.30

Contract.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.50 to 1.75
Solvent naphtha	.25

Per Pound at Producers Plant.

Phenol (nominal)	$0.48 to .50

Per 100 Pounds at Seaboard.

Sulphate of ammonia	no market

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$27.25 to 27.75
Angle bars, steel, St. Louis	19.50 to 20.00
Arch bars and transoms, St. L.	27.50 to 28.00
Arch bars and transoms, Chgo.	27.00 to 27.50
Cast, No. 1, St. Louis	15.00 to 15.50
Boiler plate, cut, No. 1, Chgo.	13.00 to 13.50
Boiler plate, cut, No. 1, St. L.	13.00 to 13.50
Boiler punchings, Chicago	20.00 to 21.00
Bundled sheet, Cincinnati	12.50 to 13.00
Busheling, No. 1, Chicago	16.50 to 17.00
Busheling, No. 1, Cincinnati	14.00 to 14.50
Busheling, No. 1, Cleveland	17.50 to 18.00
Busheling, No. 1, St. Louis	16.00 to 16.50
Busheling, No. 2, Chicago	12.25 to 12.75
Cast borings, Cincinnati	7.50 to 8.00
Cast borings, Cleveland	9.00 to 9.25
Cast borings, St. Louis	8.50 to 9.00
Cast borings, Chicago	8.00 to 8.50
Cast, No. 1, Chicago	15.25 to 15.50
Cast, No. 1, Cincinnati	15.50 to 16.00
Cast, No. 1, Cleveland	17.00 to 17.50
Cast, No. 1, St. Louis	14.50 to 15.00

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	22.75 to 23.25
Grate bars, Cleveland	12.00 to 12.50
Iron axles, St. Louis	34.00 to 34.50
Iron axles, Cleveland	43.00 to 44.00
Knuckles, coup., Chicago	22.50 to 23.00
Knuckles, coup., St. Louis	23.50 to 24.00
Locomotive tires, Chicago	31.00 to 31.50
Locomotive tires, St. Louis	31.00 to 31.50
Machine shop turnings, Chicago.	9.00 to 9.50
Machine shop turnings, Cleveland	9.00 to 9.10
Machine shop turn'gs, Cincinnati	7.00 to 7.50
Machine shop turn'gs, St. Louis.	9.25 to 9.75
Malleable agricultural, Chgo.	14.75 to 15.25
Malleable agricultural, St. Louis	15.50 to 16.00
Malleable, Cincinnati	12.50 to 13.00
Malleable railroad, Chicago	17.25 to 17.75
Malleable railroad, St. Louis	15.75 to 16.25
Pipes and flues, Cleveland	15.00 to 15.75
Pipes and flues, Chicago	13.75 to 14.00
Pipes and flues, St. Louis	14.50 to 15.00
Railroad wrought, No. 1, Cleve.	25.00 to 25.50
Railroad wrought, No. 1, Chgo.	24.00 to 24.50
Railroad wrought, No. 1, Cinci.	19.00 to 20.00
Railroad wrought, No. 1, St. L.	24.00 to 24.50
Railroad wrought, No. 2, Chgo.	22.75 to 23.75
Railroad wrought, No. 2, St. L.	23.50 to 24.00
Shafting, St. Louis	24.50 to 25.00
Springs, Chicago	23.50 to 24.00
Steel car axles, St. Louis	35.00 to 35.50
Steel car axles, Chgo.	35.00 to 36.00
Stove plate, Chicago	11.50 to 12.00
Stove plate, Cleveland	12.25 to 12.75
Stove plate, Cincinnati	10.50 to 11.00
Stove plate, St. Louis	11.50 to 12.00

(Gross Tons.)

Axle turnings, Cleveland	$16.50 to 16.75
Axle turnings, Buffalo	17.50 to 18.00
Busheling, No. 1, Buffalo	20.50 to 21.50
Busheling, No. 1, Pittsburgh	16.50 to 17.25
Busheling, No. 2, Buffalo	13.00 to 13.50
Bundled sheets, Pittsburgh	16.00 to 16.50
Bundled sheets, Cleveland	14.50 to 15.00
Bundled sheets, Buffalo	14.00 to 14.50
Bundled tin, Buffalo	13.50 to 14.00
Car wheels, (iron), Pittsburgh	21.00 to 22.00
Car wheels, (steel), Pittsburgh	27.00 to 28.00
Car wheels, Chicago	18.25 to 18.75
Car wheels, eastern Pa	20.00 to 21.00
Car wheels, Buffalo	23.00 to 23.50
Car wheels, New York	19.00 to 20.00
Car wheels, St. Louis	19.00 to 19.50
Car wheels, Birmingham	16.00 to 17.00
Car wheels, Cleveland	19.00 to 19.50
Tram car wheels, Birmingham	15.00 to 16.00
Cast borings, New York	10.50 to 11.00
Cast borings, eastern Pa	13.00 to 13.50
Cast borings, Buffalo	11.00 to 11.50
Cast borings, Pittsburgh	12.00 to 12.50
Cast, No. 1, eastern Pa	19.50 to 20.50
Cast, No. 1, Pittsburgh	20.00 to 21.00
Cast, No. 1, Birmingham	17.00 to 18.00
Cast, heavy, No. 1, N. J. points	20.00 to 20.50
Drop forge flashings, und. 10 in.	19.50
Drop forge flashings, ov. 10 in.	17.00
Forge, No. 1, eastern Pa	14.50 to 15.00
Frogs, switches, guards, St. L.	21.00 to 21.50
Grate bars, Buffalo	15.00 to 15.50
Grate bars, N. J. points	13.50 to 14.00
Heavy axle turnings, Buffalo	16.00 to 16.50
Heavy melting steel, Pittsburgh	22.00 to 23.00
Heavy melting steel, Buffalo	25.50 to 26.50
Heavy melting steel, Chgo	21.75 to 22.25
Heavy melting steel, Cleveland	22.00 to 22.50
Heavy melting steel, Cincinnati	19.00 to 20.00
Heavy melting steel, eastern Pa.	19.50 to 20.50
Heavy melting steel, New York	17.50 to 18.00
Heavy melting steel, St. L	22.00 to 22.50
Heavy melting steel, Birmingham	15.00 to 16.00
Hydraulic pressed sheet, Clevel'd	18.00 to 18.50
Hydraulic pressed sheets, Pbgh.	18.00 to 18.50
Hydraulic pressed sheets, Chgo.	14.50 to 15.00
Iron rails, Chicago	27.00 to 27.50
Iron rails, Buffalo	25.00 to 26.00
Iron rails, Cincinnati	24.00 to 25.00
Iron rails, St. Louis	27.00 to 27.50
Iron rails, Cleveland	29.00
Iron axles, Pittsburgh	39.00 to 40.00
Iron axles, Cincinnati	40.00 to 41.00
Iron axles, eastern Pa	38.00 to 40.00
Iron axles, Chicago	38.00 to 39.00
Iron axles, Buffalo	45.00
Low phos. steel, Buffalo	32.00 to 36.00
Low phos. steel, Pittsburgh	30.00 to 32.00
Low phos. steel, eastern Pa	30.00 to 32.00
Machine shop turnings, Buffalo	11.00 to 11.50
Mch. shop turnings, New York	10.00 to 10.50
Mch. shop turnings, Pittsburgh	11.75 to 12.25
Mch. shop turnings, eastern Pa.	12.00 to 12.50
Mch. shop turnings, Birmingham	8.00 to 9.00
Malleable railroad, Cleveland	20.50 to 21.00
Malleable railroad, Buffalo	22.00 to 23.00
Malleable railroad, Pittsburgh	21.00 to 21.25
Malleable railroad, eastern Pa	16.50 to 17.00
R. R. and mch. cast, No. 1, Bfl.	22.50 to 23.00
R. R. wrought, No. 1, Buffalo	30.00 to 31.00
R. R. wrgt., No. 1, eastern Pa.	26.00 to 27.00
City wrought, New York	21.25 to 21.50
R. R. wrought, No. 1, Pbgh	24.00 to 24.50
R. R. wrought, No. 1, B'ham	18.00 to 19.00
Reroll. rails, 5 ft. & ov., Pbgh.	29.00 to 30.00
Reroll. rails, 5 ft. & ov., Chgo.	25.50 to 26.00
Reroll. rails, 5 ft. & ov., E. Pa.	27.00 to 28.00
Reroll. rails, 5 ft. & ov., St. L.	25.50 to 26.00
Shafting, New York	24.00 to 25.00
Shafting, eastern Pa	26.50 to 27.50
Shoveling steel, Chgo	18.25 to 18.75
Shoveling steel, St. Louis	18.50 to 19.00
Steel rails, short, Chicago	23.75 to 24.25
Steel rails, short, Cleveland	23.50 to 24.00
Steel rails, over 6 ft., Cleveland.	20.50 to 21.50
Steel rails, old, Birmingham	17.00 to 18.00
Steel rails, short, St. Louis	24.50 to 25.00
Steel car axles, Birmingham	34.00 to 35.00
Steel car axles, New York	38.00 to 40.00
Steel car axles, Buffalo	45.00
Steel car axles, Cleveland	49.00 to 50.00
Steel car axles, Pittsburgh	39.00 to 40.00
Steel car axles, eastern Pa	41.00 to 43.00
Stove plate, N. J. points	14.00 to 14.50
Stove plate, Birmingham	11.00 to 12.00
Stove plate, Buffalo	14.00 to 14.50
Stove plate, eastern Pa	16.00 to 17.00
Stove plate, Pittsburgh	13.00 to 14.00
Wrought pipe, Buffalo	16.00 to 16.50
Wrought pipe, eastern Pa	16.75 to 17.25
Wrought pipe, New York	14.50 to 15.00

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United Smelt'g & Alum. Co., New Haven, Ct.

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American Vanadium Co., Pittsburgh, Pa.

ALUMINUM ALLOYS.

United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM INGOTS.

United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS (Sheet).

United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS (See Steel, Structural).

ANNEALING BOXES AND POTS.

Blackwood Steel Fdy. Co., The, Springfield, O.
Knox Pressed & Welded Steel Co., Pittsburgh.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ANTI-SLIP TREADS FOR STAIRS.

Pittsburgh Iron & Steel Foundries Co., Pittsburgh, Pa.

ARCHITECTURAL SHAPES.

Empire Art Metal Co., College Pt., N. Y.

ARMATURES.

General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.

Lakewood Engrg. Co., Cleveland, O.

AUTO TOWING CABLES.

American Steel & Wire Co., Chicago, Ill.

AUTO TRUCKS.

Federal Motor Truck Co., Detroit, Mich.

AXLES.

American Bridge Co., New York City.
American Steel Export Co., New York City.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Co., Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.

Keystone Bronze Co., Pittsburgh, Pa.
Lubricating Metal Co., The, New York City.
Ryerson, Jos. T., & Son, Chicago, Ill.

BAKERS, WIRE COATING.

Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALE TIES.

American Steel & Wire Co., Chicago, Ill.

BALLS (Steel).

Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDERS (Hydraulic for Projectiles).

Southwark Foundry & Mach. Co., Philadelphia.
West Tire Setter Co., The, Rochester, N. Y.

BANDS (Steel).

Akron-Selle Co., The, Akron, O.
Carnegie Steel Co., Pittsburgh, Pa.

BARGES (Steel).

American Bridge Co., New York City.

BARRELS, TUMBLING (Wire Nails).

Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS (Concrete Reinforcing).

Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.
Witherow Steel Co., Pittsburgh, Pa.

BARS (Iron and Steel).

American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bingham, W., Co., The, Cleveland, O.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Company, Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Alloys Steel Corp., The, Canton, O.
Upson Nut Co., Cleveland, O.
Westerman & Co., Lockport, N. Y.

BEAMS, CHANNELS AND ANGLES.

American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Empire Art Metal Co., College Pt., N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS (Ball).

New Departure Mfg. Co., Bristol, Conn.

BEARINGS (Vanadium Steel).

American Vanadium Co., The, Pittsburgh, Pa.

BELT CEMENT AND DRESSING.

Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.

BELT LACING (Leather).

Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.

BELTING (Chain).

Link-Belt Company, Chicago, Ill.

BELTING (Leather).

Bingham, W., Co., The, Cleveland, O.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.

BENCHES (Steel).

New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES (Drawing).

Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.

Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Lourie Mfg. Co., Springfield, Ill.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

BENZOL RECOVERY PLANTS.

Koppers, H., Co., Pittsburgh, Pa.

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